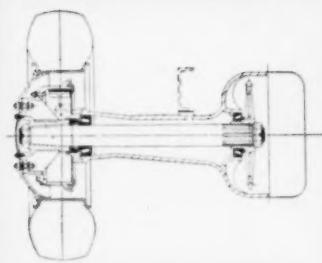
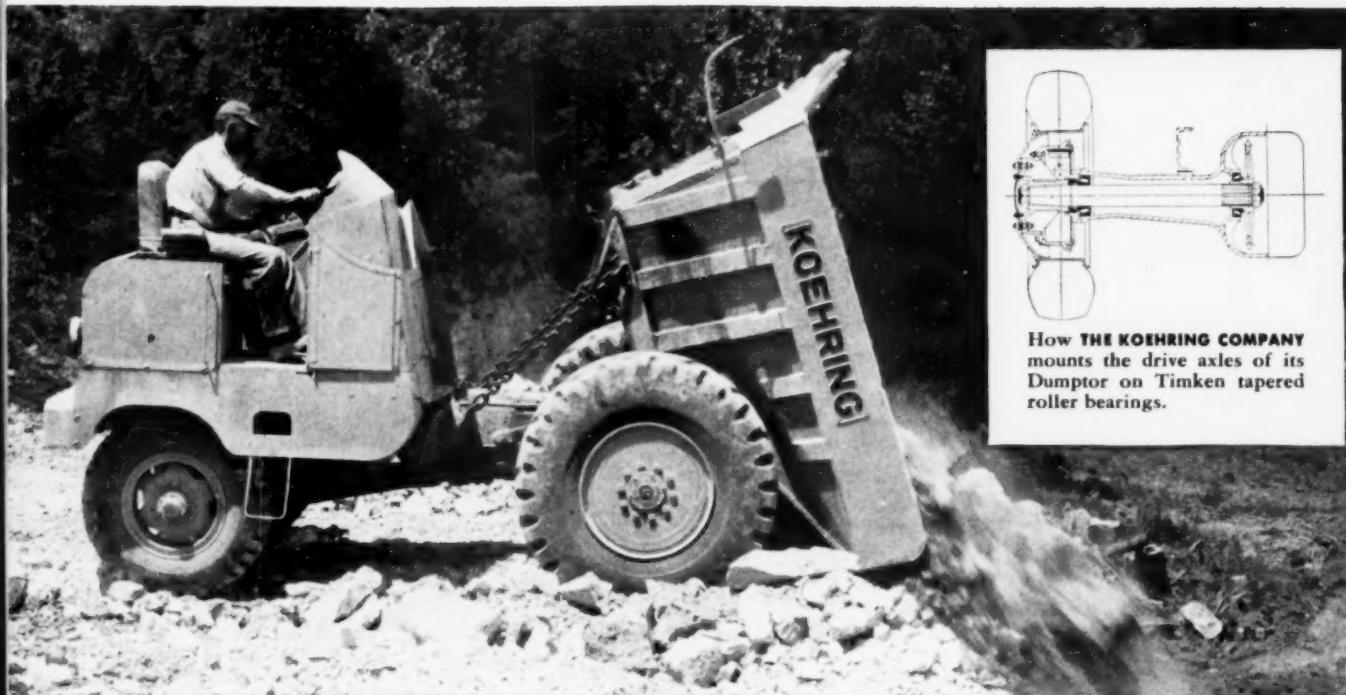


ROADS AND STREETS

HIGHWAYS BRIDGES
AIRFIELDS
HEAVY CONSTRUCTION

JULY 1953



HOW THE KOEHRING COMPANY mounts the drive axles of its Dumper on Timken tapered roller bearings.

Fast reverse speeds eliminate turns— **TIMKEN®** bearings add dependability

BECAUSE the Koehring Dumper travels as fast in reverse as it does forward, it eliminates turns on shuttle hauls, saves as much as $\frac{1}{2}$ minute every round trip. To keep it on the job, day after day, with minimum time-out for maintenance and lubrication, Koehring mounts the directional transmission reduction shafts and drive axles on Timken® tapered roller bearings.

Line contact between the rollers and races of Timken bearings provides extra load-carrying capacity. Due to their tapered construction, Timken bearings take both radial and thrust loads in any combination. Shafts are held in proper alignment, gears mesh with accuracy,

wear is reduced.

Closures are more effective because Timken bearings keep housings and shafts concentric. Lubricant is kept in—dirt, mud and water are kept out. And friction is practically eliminated due to the incredibly smooth surface finish and true rolling motion of Timken bearings.

No other bearing gives you *all* the advantages you get with Timken tapered roller bearings. Make sure you have them in all the equipment you build or buy. Always look for the trademark "Timken" on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

TIMKEN
TAPERED ROLLER BEARINGS



NOT JUST A BALL ○ NOT JUST A ROLLER ○ THE TIMKEN TAPERED ROLLER ○ BEARING TAKES RADIAL ○ AND THRUST → ○ LOADS OR ANY COMBINATION

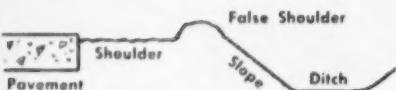


TELEGRAPH

Mr. Public Official:

DO YOUR HIGHWAYS HAVE A SHOULDER PROBLEM
THAT THREATENS SAFETY . . . CAUSES EXCESSIVE
BREAKUPS OF YOUR PAVED ROADS? IF SO . . .
HERE'S A PRACTICAL, ECONOMICAL METHOD
FOR FIRST RE-SHAPING, THEN MAINTAINING THOSE
SHOULDERS WITH ONE MACHINE, ONE OPERATOR.

THE PROBLEM



CROSS-SECTION of typical paved road with false shoulder that prevents proper drainage, encourages erosion of shoulder material and damage to pavement.

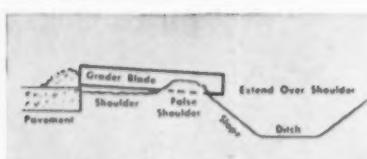
ACTUAL PHOTO of false shoulder, consisting of sod mat 3 to 4 inches high.



THE REMEDY



Cut off false shoulder with the Allis-Chalmers Model D's ROLL-AWAY moldboard—roll sod to edge of pavement.



Set grader moldboard as shown to insure clear cut and eliminate any obstacle to adequate drainage.



Windrow of sod consists mainly of root mat. Note that grader blade did not disturb or cut into shoulder gravel.



Load sod into truck with Model D's rear-end loader. Wide bucket lies flat on pavement, picks up cleanly without disturbing shoulder gravel.



Now slope shoulder with grader moldboard and feather windrow out behind with Shoulder Maintenance Blade.



The finished job—a smooth, safe, well-drained shoulder.

WITH false shoulder removed and proper shape re-established, the Allis-Chalmers Model D and rear-end loader with interchangeable Shoulder Maintenance Blade can keep the road in tip-top condition easily and at low cost. It's another money-saving application for the Model D, the most versatile of all motor graders. For more information on shoulder maintenance, write now for Booklet MS-896, or ask your Allis-Chalmers dealer for a demonstration.

ROLL-AWAY is an Allis-Chalmers trademark



ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE I. U.S.A.



How is this for Flexibility in an 18-in. Diameter Culvert Pipe?

This 28-ft culvert is flexing under its own weight. Made of 16-gage galvanized sheet steel, it consists of two 14-ft sections joined by a single field coupling. Its total weight is 440 lb.

Large-diameter corrugated pipe of sheet steel has a high degree of flexibility and tensile strength. These properties allow the pipe to conform to irregular grade in a trench. They mean that the pipe can absorb changing loads caused by shifting or freezing soils, without pulling apart. And they permit it to withstand the impact and vibration of overhead traffic.

In addition, this kind of pipe weighs only a fraction as much per foot as comparable pipe of other materials. It comes in longer sections that are easy to handle without special lifting equipment, and that require the minimum of field joints.

COPPER-BEARING, CORROSION-RESISTING STEEL

Bethlehem does not fabricate culvert or drainage pipe, but does manufacture the Beth-Cu-Loy galvanized corrugated and flat steel stock used by pipe fabricators. This copper-bearing steel carries

a heavy coating of zinc and has excellent resistance to corrosion. It more than meets Federal specifications, as well as those of the American Association of State Highway Officials.

If you would like further information on Beth-Cu-Loy, or if you would like to know who uses it in culvert pipe, write or phone any Bethlehem office.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation



BETH-CU-LOY GALVANIZED CULVERT SHEETS

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ROADS AND STREETS

JULY, 1953 • VOL. 96 • No. 7

Roads and Streets represents 61 years of continuous publishing in the highway field; combined with Engineering & Contracting and Good Roads Magazines, established in 1892

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A magazine devoted to the design, construction, maintenance and operation of highways, streets, bridges, bridge foundations and grade separations, and to the construction and maintenance of airports.

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Paving Methods

Several articles shaping up on current heavy-duty runway extension work for jet planes.

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"Grade Crossing-less" City

How Fostoria (Ohio) traffic snarl has been eliminated by a state-city federal program embodying three grade separations and four miles of street reconstruction on urban arterial routes.

Getting Your Heavy Equipment to the Job

An article by a manufacturing leader will analyze the problem of transportability of road-building and construction equipment, and some of the problems and policies involved. (Do you realize that equipment moves often represent \$2,000 to \$3,000 per mile of road-building cost?)

And Also . . .

Fast "photo finish" of paving contractors to open Oklahoma's Turner Turnpike on time . . . Salt stabilization methods on Illinois local road project . . . Soil cement paving for 13-acre auto storage terminal; processing done in "wet" to secure good traction in sand . . . Special reports coming on the big Eastern toll road projects.

How does your city clear snow from downtown areas? Read series of reports in coming issues.

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"I wanted a loader for three or four years," says B. C. Foster, contractor, of Redding, Calif., "and I talked to everybody I knew with various rigs. The answer every time was, 'Buy a Caterpillar machine.' I've certainly had good going with my Cat* HT4 Shovel. Its versatility and easy handling make it an ideal rig for my work."

Mr. Foster's Caterpillar 1½-yard HT4 Shovel handles materials, does precise grading and excavating, and general contracting work. In the photograph, taken at a gravel plant near Redding, note the scarifier, for ripping up pavement on street contracting jobs, mounted on the rear of this versatile machine.

The Caterpillar HT4 Shovel is engineered to take the stresses of a multitude of jobs. The girder-type frame is mounted low and close to the carrier rollers to keep the load off the transmission housing and track frames. A spacer bar between the lift arms keeps the bucket level,

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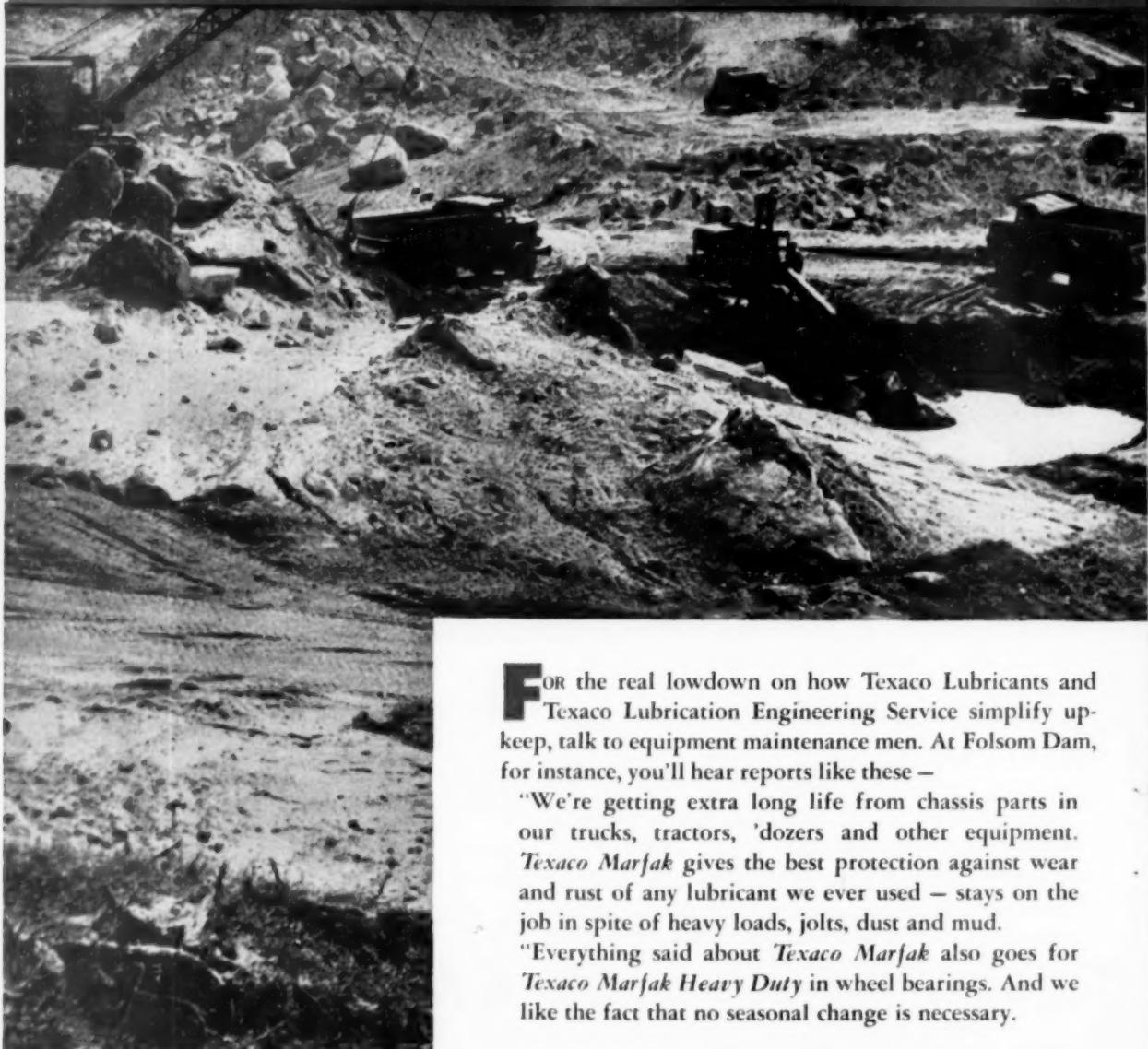
Caterpillar Tractor Co., Peoria, Illinois.

CATERPILLAR*

*Both Cat and Caterpillar are registered trademarks—®

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YOUR DEALER
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TEXACO HELPS MAINTAIN AT FOLSOM DAM



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"We're getting extra long life from chassis parts in our trucks, tractors, 'dozers and other equipment. *Texaco Marfak* gives the best protection against wear and rust of any lubricant we ever used — stays on the job in spite of heavy loads, jolts, dust and mud.

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**Contractor: Merritt-Chapman & Scott Corporation
and The Savin Construction Corporation**



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FOR ALL CONTRACTORS' EQUIPMENT



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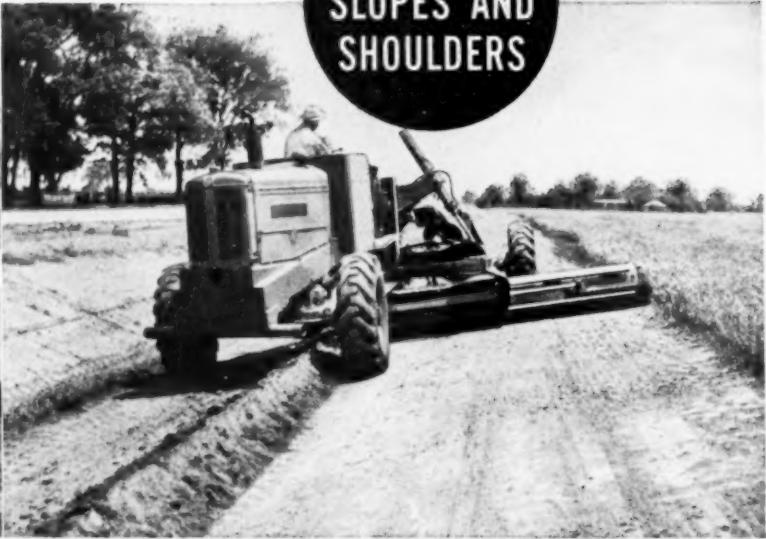
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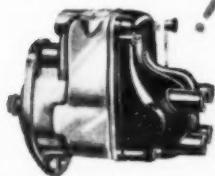
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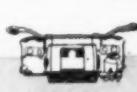
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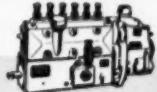
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Cedarapids

CEDARAPIDS

WHEN YOU PRODUCE CRUSHED STONE

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THINK BIG about production and profit on your next job . . . then check the coupon below for more information about the Cedarapids equipment you need . . . or see your Cedarapids distributor for complete details.

600 TONS PER HOUR AVERAGE PRODUCTION FOR THIS MODEL 53605

This is the big Cedarapids Double Impeller Impact Breaker, formerly known as Model 5050, which averaged 600 tons per hour on the New Jersey Turnpike job, and hit a peak-day production record of 724 tons per hour! Here's a unit that really lets you *think big* in terms of production of the cubical shaped aggregate required in so many specifications today. And it holds operating and maintenance costs right at rock bottom! Because so much of the material is broken in suspension, there's 50% less contact of stone on metal. Wear is reduced and horsepower requirements are exceptionally low. High capacity and the high ratio of reduction mean a lower plant investment because much accessory equipment like secondary crushers, screens, conveyors, etc., is eliminated.

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This package includes a:

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3. The Sky-Worker designed to solve your overhead problems, eliminates the fatigue, slowness and hazards of

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For full details write for bulletin SKI-53.

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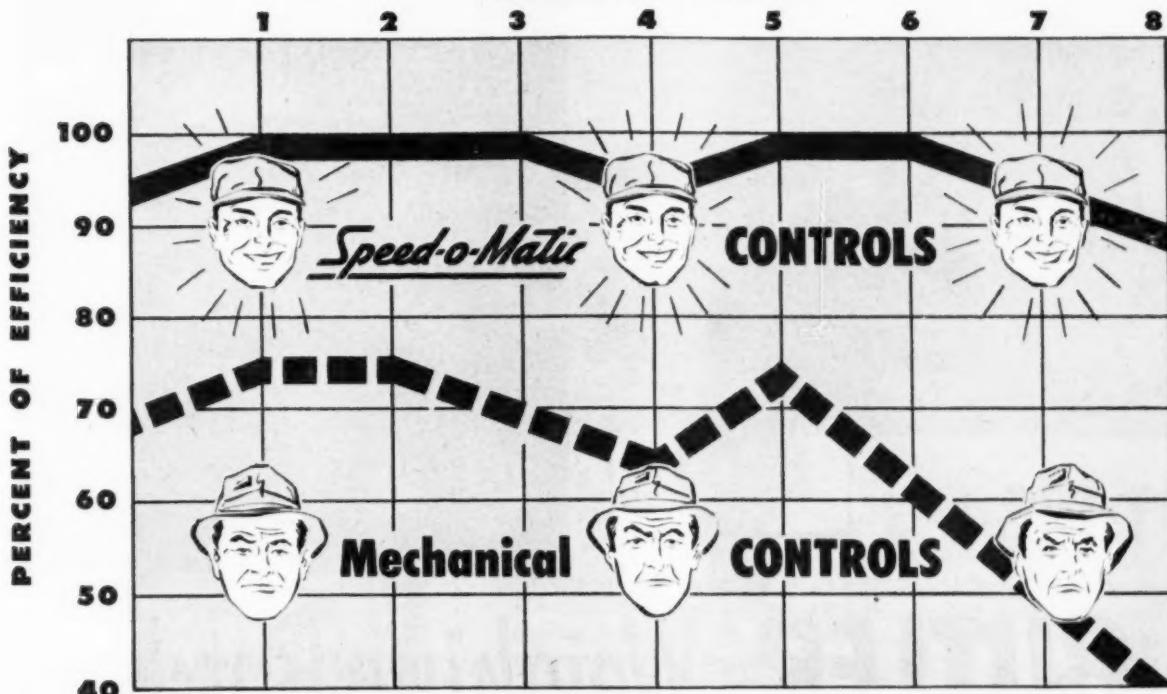
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WEST CHESTER • PENNSYLVANIA

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COMPARE CONTROLS!

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Based on scientific analysis, this chart shows the penalty you pay for operator fatigue when your machines have manual controls as compared to Speed-o-Matic controls.

Link-Belt Speeders with Speed-o-Matic controls boost your production up to 25%

THE exclusive Link-Belt Speeder power hydraulic control system provides instant, smooth response for faster working cycles. Finger-tip-operated, Speed-o-Matic controls permit the operator to feel the load at all times for fast, safe, accurate, smooth operation. There's no jerk, jump, or lag. And . . . because Speed-o-Matic is so easy on the operator . . . costly end-of-the-shift letdowns are eliminated.

This system's simplicity and freedom from mechanical linkage cuts overall maintenance and minimizes the need for clutch adjustment. Some Link-Belt Speeder owners report using these outstanding rigs for months without a clutch adjustment.

For details on the Link-Belt Speeder line of crawler, truck and wheel-mounted models, write for catalog 2373.

LINK-BELT SPEEDER CORPORATION
Cedar Rapids, Iowa

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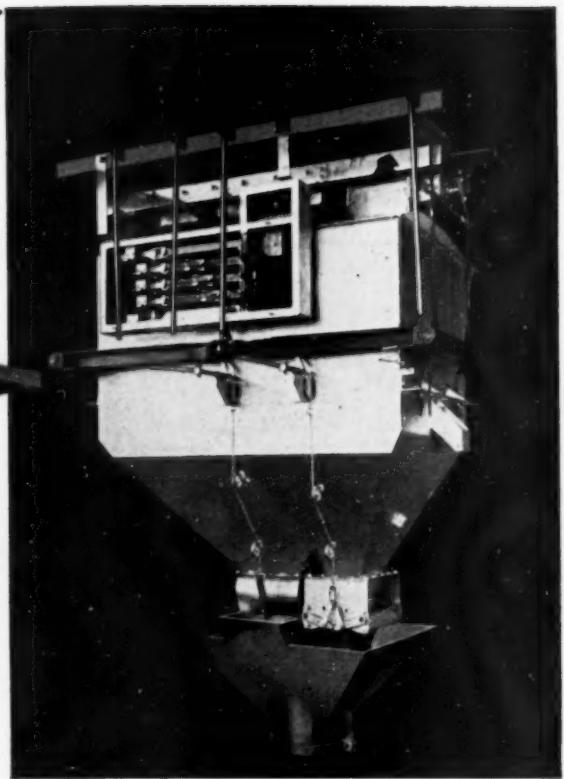
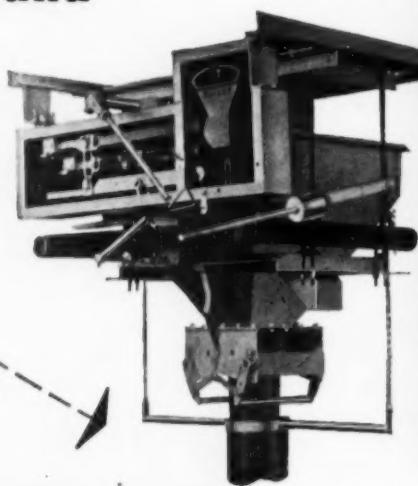
Digging blasted rock like this can be a "rig-and-man-killer." But on this 1½ yard Link-Belt Speeder K-360 with Speed-o-Matic controls, fingers do the work instead of muscles and digging shock on machine components is minimized.

LINK-BELT SPEEDER CORPORATION

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heart and
hand
is the**



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So, whether you need a completely automatic, vastly complex, mistake-proof, pushbutton Batcher to weigh out as many as 8 materials . . . or a combination Batcher for cement and aggregate . . . or a Batcher for 3 aggregates . . . or fast-stepping, high production Batchers for your Roadbuilders' set-up — it's profitable and wise to insist on the BUTLER nameplate.

BUTLER BIN COMPANY
959 BLACKSTONE AVE.
WAUKESHA, WISCONSIN



Gradall "fills in" on Farbizo's slag pit operation during busy periods.



Clarence Farbizo, President and General Manager, right, talks over new job with Gradall driver.



"Our records prove the Gradall's fast, clean work really pays off," says Arthur Earle, Secretary and Treasurer of the firm.

**Gradall Distributors
in over 75 principal cities
in the United States and Canada**

Follow-up to a Success Story!

A FEW MONTHS AFTER Farbizo Slag, Inc. of Dover, Ohio, bought a Gradall for its slag pit operation, the firm purchased a second Gradall for a profitable contracting business that had developed through the use of the first machine.

When the owners, Clarence Farbizo and Arthur Earle, bought the first Gradall they intended to use it full time in their slag pit. However, during the slack periods they "tested" their Gradall on a few outside jobs.

"We thought we should know its capabilities in case we wanted to use the machine on outside work," Farbizo said.

"The word soon spread that our Gradall could do a better job—quicker and cheaper. The machine practically eliminates hand labor from digging basements, excavating for gas tanks and cesspools, digging silo foundations, trenching, and the like," Earle added.

There were so many jobs for the Gradall outside the slag pit that they bought their second Gradall. Now both machines are busy full time, one working in the slag pit and the other on outside contracts.

Yes, there are always jobs to keep a Gradall busy. Its quickly interchangeable attachments enable it to do the work of several one-purpose machines. And its unique, hydraulic arm-action handles each job fast and efficiently—eliminating costly hand labor.

But see a Gradall in action—see for yourself how it can make your operation more profitable. Your nearest Gradall Distributor will be glad to give you a field demonstration of the Gradall's many uses.

Gradall
DIVISION OF

WARNER & SWASEY
Cleveland
PRECISION
MACHINERY
SINCE 1891



"There's
only
ONE
reason!"

IT'S JUST THAT SIMPLE. There's only one reason in the world why so many wire rope users in the excavating and construction field prefer Roebling wire rope... *it costs a lot less on the job than any other.*

For maximum wire rope efficiency and economy, call your nearest Roebling office for a Field Man. He'll recommend the best ropes for your machines.

JOHN A. ROEBLING'S SONS CORPORATION, TRENTON 2, N. J. BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. • CHICAGO, 8825 W. ROEBLING RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 13325 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6314 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1930 E. 2ND ST. • PHILADELPHIA, 330 VINE ST. • SAN FRANCISCO, 1740 19TH ST. • SEATTLE, 900 1ST AVE. B. • TULSA, 331 N. CHEYENNE ST. • EXPORT SALES OFFICE, TRENTON 2, N. J.



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FORD DEALERS EVERYWHERE

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Users of industrial powered machinery have come to understand why both operators and original equipment manufacturers today specify Ford Engines. Those who have suffered serious losses through excessive "downtime" on their jobs appreciate the advantages of quick availability of Ford replacement parts.

Located in virtually every city, town and village, more than 6,400 Ford Dealers carry substantial stocks of Genuine Ford Parts which can be obtained over the counter or ordered by phone and installed with a minimum of delay. These parts are available at low cost, along with the services of Ford dealers' trained mechanics whenever necessary.



FORD HEAVY DUTY INDUSTRIAL ENGINES
and Power Units are not only priced right, but are famous for their high-precision standards and rugged construction. Within their range, there's a series ideally suited to the needs of your equipment. Why not look into it right now?

6 Great Engines

Designed and built for industrial use, Ford Heavy Duty Engines are now offered in six series: One 4-cylinder, two 6-cylinder and three V-8's, ranging from 134 to 317 cu. in. displacement. All are completely tested and ready to run when delivered to you. Write for descriptive literature on these engines and also the Ford MULTA-TORQUE Converter.

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WHEN IT'S FORD-POWERED!



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FORD MOTOR COMPANY
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(State your application)
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Firm Name _____ (Please print)

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City _____ Zone _____ State _____ C

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makes a big difference!



When you need that extra push, you'll be glad your machine is a P&H. With its low center of gravity, better balance and all-welded construction of rolled alloy steels — you can exert more power at the tooth point with less strain or danger of tipping. That's what gives you the added work capacity. You can prove this for yourself as many others have done. Ask to

see a P&H on a job near you. Watch it work!

And while you're there, watch the mobility on true tractor-type crawlers. Note how smooth hydraulic control enables the operator to "feel" the load at all times. It's easier on both man and machine. And far easier on maintenance. You'll sell yourself on P&H in a hurry.

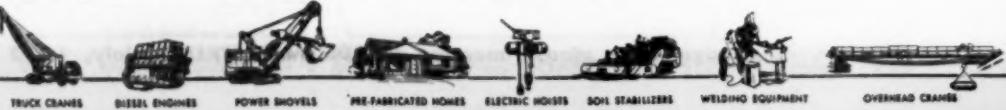
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the **P&H** Line





CHEVROLET ADVANCE-DESIGN TRUCKS

**More work per dollar
... and here are
4 powerful reasons why!**

MORE POWER AT LOWER COST! Watch costs go down when you put the new heavy-duty power of Chevrolet's advanced Loadmaster engine to work! The new high-compression ratio of 7.1 to 1 in this great engine brings you more power and even greater economy than before. Chevrolet's Thriftmaster engine, too, in light- and medium-duty models offers exceptional economy of operation.

FACTORY-MATCHED TO THE JOB! Some jobs demand more power. Some demand stronger springs. But, whatever the requirements of your job, Chevrolet trucks are carefully *factory-matched* to the work to be done, with the *right* power—and the *right* units from tires to axle, springs to clutch—to handle that work at lowest cost.

MORE RUGGED THAN EVER! There is extra economy, too, in the exceptional stamina of Chevrolet trucks. You can expect new ruggedness and strength with heavier, more rigid frames and brawnier construction throughout. You can expect extra miles added to the life of your truck, plus a substantial reduction in the over-all cost of hauling.

LOWEST PRICED LINE! Chevrolet trucks are known for qualities and features matched by no other trucks. Yet, with all these advantages, the Chevrolet line lists for less than any other trucks of comparable size and specifications. See your Chevrolet dealer. Chevrolet Division of General Motors, Detroit 2, Michigan.

CHEVROLET ADVANCE-DESIGN TRUCK FEATURES

TWO GREAT VALVE-IN-HEAD ENGINES—the Loadmaster or the Thriftmaster—to give you greater power per gallon, lower cost per load. **POWER-JET CARBURETOR**—for smooth, quick acceleration response. **DIAPHRAGM SPRING CLUTCH**—for easy-action engagement. **SYNCHRO-MESH TRANSMISSION**—for fast, smooth shifting. **HYPOID REAR AXLE**—for dependability and long life. **TORQUE-ACTION BRAKES**—on light-duty and medium-duty models and on front of heavy-duty models. **TWIN-ACTION REAR BRAKES**—on heavy-duty models. **DUAL-SHOE PARKING BRAKE**—for greater holding ability on heavy-duty models. **CAB SEAT**—with double deck springs for complete riding comfort. **VENTIPANES**—for improved cab ventilation. **WIDE-BASE WHEELS**—for increased tire mileage. **BALL-GEAR STEERING**—for easier handling. **UNIT-DESIGNED BODIES**—for greater load protection. **ADVANCE-DESIGN STYLING**—for increased comfort and modern appearance.



HEILINERS

Reduce Maintenance Downtime and Costs

... and that's where you make money on earth moving, with a machine that spends more hours on the job moving dirt. Heiliners are designed for easy, time-saving maintenance, and remember, wherever you're working, your nearby Heiliner distributor is ready to serve you with genuine Heiliner parts and the expert service of factory-trained field mechanics.



NO NEED TO PULL WHEELS TO REPLACE AXLE

Just take off the hub cap to replace the axle shaft or adjust the final drive! No shoring or cranes is ever required and best of all one man can do the job without any special training.



REPLACE PCU CLUTCH CONE IN 15 MINUTES

Heiliner's cable power control unit is readily accessible for easy servicing with no complicated housing to remove. Large-diameter run cool, cable lasts longer, costs are lower. Cover which protects the drums, on hinges to give additional accessibility.



ALL PARTS EASILY ACCESSIBLE

Due to Heil automotive-type design, all operating components are simple and easy to service.

THE HEIL CO.

DEPT 473, 3004 WEST MONTANA ST.
MILWAUKEE 1, WISCONSIN

Factories: Milwaukee, Wis.—Hillside, N. J.
Sales Offices: New York, Union, N. J.,
Washington, D. C., Atlanta, Cleveland,
Milwaukee, Detroit, Chicago, Kansas City,
Denver, Dallas, Los Angeles, Seattle;
Rio de Janeiro, Brazil.

HOW HEILINER DESIGN SIMPLIFIES MAINTENANCE

WITH "time on the job" so important in working close earthmoving schedules, every feature of the Heiliner has been designed to reduce downtime to the barest minimum.

By designing the Heiliner along automotive lines, the time usually required to make major repairs has been reduced in many cases from days to hours. For example the axle can be replaced without removing the wheels. The clutch or transmission can be repaired without pulling the engine. The hydraulic pump can be changed in 1½ hours . . . transfer case can be taken off in 20 minutes . . . Hydrosteer can be replaced in 2 hours, and it's easier to take up slack on the steering cylinders.

Your Heil distributor will be glad to give you the complete story about all the other Heiliner features that help you move more yards of dirt at less cost per yard.

The chart below shows maintenance figures on major Heiliner repair jobs. Compare these figures with those for any other rubber-tired earthmovers on the market today.

| | |
|--|--------------------|
| Remove and Replace Axle Shaft | 1-2 hrs. (1 Man) |
| Remove and Replace Master Clutch | 4-6 hrs. (2 Men) |
| Remove and Replace Transmission | 4-6 hrs. (2 Men) |
| Adjust or Replace Final Drive | 1-2 hrs. (1 Man) |
| Remove and Replace Axle Differential Carrier | 8-10 hrs. (2 Men) |
| Adjust P.C.U. Brake and Clutch | 10-15 Min. (1 Man) |
| Replace P.C.U. Clutch Assembly | 10-15 Min. (1 Man) |
| Replace P.C.U. Brake Assembly | 15-20 Min. (1 Man) |



Heiliners spend more time on the job . . . less in the shop . . . to keep earthmoving projects moving at a schedule-clipping pace.



A Complete Line of
PERFECTION
HOISTS

*for
 every Make
 and Model
 Truck*

All parts of PERFECTION Hoists — pumps, power take-offs, and cylinders are engineered and guaranteed by PERFECTION. Each part is carefully inter-designed with all other parts, to produce units of exceptional efficiency, power, and dependability.

Model 7780 Telescopic

3-stage, telescopic, dual cylinder design provides tremendous lifting capacity with least weight, simple construction, and smooth operation. Direct upward lift is applied at the center of the load. For mounting on trailers with bodies up to 30 cu. yard capacity. Extra heavy-duty service.

Models 727 • 827 • 1027 • 1034 Roll-A-Lift

A constant-low-pressure-type hoist that develops tremendous lifting capacity in relation to its piston displacement. Engineered for those jobs that require a rugged and powerful hoist. Four standard models cover body capacities from 6 to 20 cu. yards. Heavy-duty service.

Models 725 • 820 • 825

Compound-type, double lift-arm design, for medium and heavy-duty service. Three standard models for body capacities of 6 and 7 cu. yards.

Models 615 • 715 • 715L • 720

Rugged double lift-arm hoists for light and medium-duty service. Four standard models cover body capacities from 1½ to 6 cu. yards.

**Models 615B
 715B • 720B**

Low-mount, double lift-arm hoists for mounting with medium and heavy-duty platform and stake bodies. Three models for bodies from 9 ft. to 16 ft. long.

Write for Literature Today

TRUCK BODIES and
 HYDRAULIC HOISTS

THE
PERFECTION
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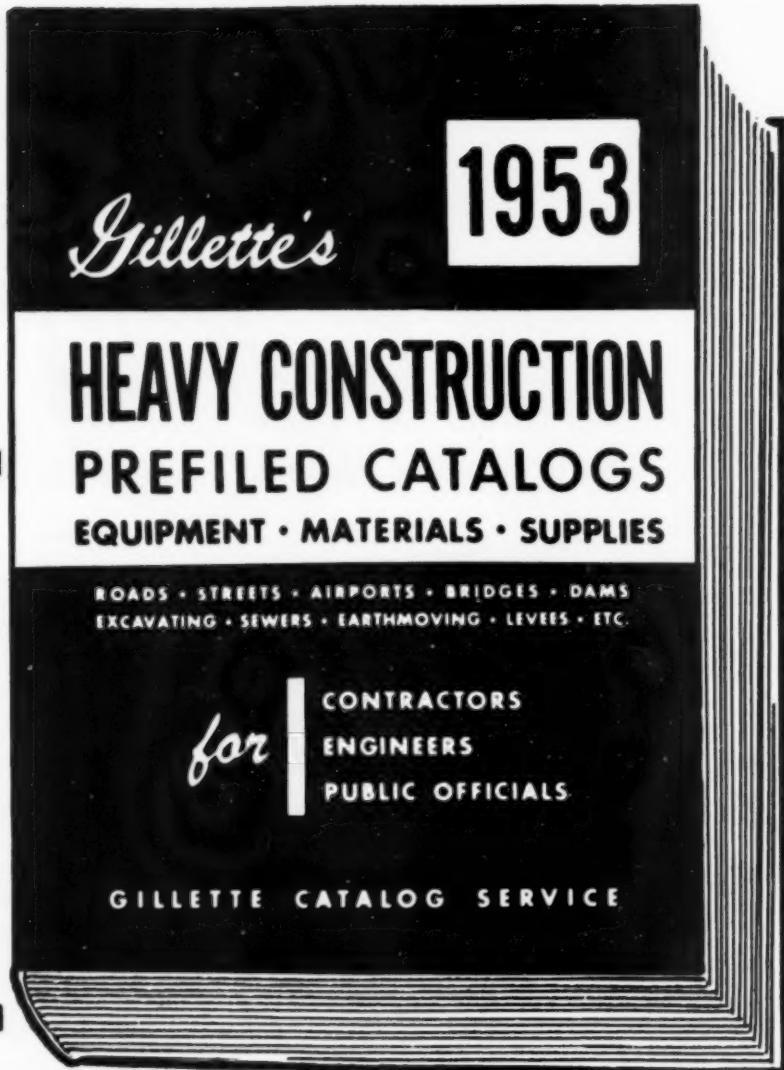
STANDARD and SPECIAL UNITS
 IN ALL SIZES — FOR ANY USE

Engineered, Manufactured
THE PERFECTION STEEL BODY CO.

and Guaranteed by
 Dept. R-73, Galion, Ohio, U.S.A.

*It's in your
Office Now . . .*

**KEEP IT HANDY—
USE IT OFTEN—**



Your most useful source of Buying Information

- This book saves you cabinet and floor space and the secretarial time that would otherwise be spent in classifying and filing individual manufacturers' catalogs.
- It saves you, too, the time and trouble of writing to manufacturers for the information you need. Here are enough facts to enable you to study the product that interests you and to decide whether to call your local dealer or distributor for decisive action.
- When you want information quickly, on a certain class of product or on the product of a specific manufacturer, turn first to the index for the name or trade name of the product in which you are interested and then to the manufacturers' catalog which is arranged in alphabetical order by manufacturers' name.

When you are in the market for new construction equipment, materials or supplies, turn to Gillette's Heavy Construction Prefiled Catalogs for information on what to buy and from whom. Here's the swift, economical and satisfying way to make your pre-purchase studies. In this single volume many of America's leading manufacturers of these products have placed their catalogs, many of them specially designed for your convenience—"boiled down" to save you time and energy.

CATALOGS....

the way you asked for them—PREFILED

Contractors, engineers, public officials PREFER receiving manufacturers' catalogs PREFILED rather than to have individual catalogs sent by manufacturers. Individual catalogs are usually mislaid or thrown away.

The manufacturers listed below have followed your wishes—and at considerable expense. Through the PREFILED method they have supplied you with catalog information on their products in the current 1953 edition of Gillette's Heavy Construction Catalog File (See opposite page). Be sure to take advantage of this information. Use the Gillette Catalog File all the time. Keep it handy every day—every week. Use it often. Consult the Catalog File when you want information before buying new equipment, materials or supplies.

Here is the list of manufacturers who have supplied you with buying information on their products.

Adams Manufacturing Co., J. D.
All-Chained Equipment Co.
All Purpose Spreader Company
American Air Filter Co.
American Bosch Corporation
American-Coleman Company
American Manganese Steel Division
American Tire & Wire
American Sheet & Wire
American Tractor Equipment Corp.
Anthony Company
Arms Drainage & Metal Products, Inc.
Arrow Manufacturing Company
Austin-Western Company
Baldwin-Lima-Hamilton Corp.
Badger Machine Co.
C. C. Ballou Co.
Beardleay and Piper
Bicknell Manufacturing Company
Briscoe & Son, E. V.
Bren Boiler & Mfg. Co., Wm.
Buda Company, The
Buffalo-Springfield Roller Co., The
Butler Bin Company
Carey Manufacturing Co., The Phillip
Carver Co., Ralph B.
C. H. & E. Manufacturing Co., Inc.
Chausse Manufacturing Co., Inc.
Cleaver-Brooks Company
Cleveland Formgrader Co., The
Cleveland Fores and Crossing Co.
Cleveland Tractor Company, The
Clipper Manufacturing Co.
Clyde Iron Works

Concrete Surfacing Machine Co.
Crockets & Son Company, The F. D.
Cummins Engine Company, Inc.
Davenport Boiler Corporation
Detroit Diesel Engine Division
Dixie Tally-Ho, Inc.
Dorsey Trailers
Eagle Crusher Co., Inc.
Electric Tumbler & Equipment Co.
Erk Block Construction Company
Fiske Manufacturing Co.
Fiske Brothers Raffing Co.
Flexible Road Joint Machine Co., The
Flintkote Company, The
Foundation Equipment Corporation
Frese Manufacturing Co.
Galion Allis-Chalmers Company
Galloway-Wood Mfg. Company
Gar Wood Industries, Inc.
General Excavator Co.
General Motors Corporation
Gledhill Road Machinery Co., The
Goodall Rubber Company
Greatall Division, Warner & Swasey
Haiss Mfg. Co., Inc., Geo.
H. & L. Tooth Co.
Hammermill, Inc.
Harnischfeger Corporation
Hauck Manufacturing Co.
Heitzel Steel Form & Iron Co.
Herron Meters Corporation
Herman Nelson
Highway Equipment Co., Inc.
Hose Accessories Company

Hough Co., The Frank G.
Huber Manufacturing Co., The
Johnson Vibrators, Inc.
Johnston and Jennings Co.
Joint Equipment Company, Inc.
Joy Manufacturing Company
Keystone Asphalt Products Company
Kiesler Co., Jos. E.
La Crosse Trailer Corporation
Leese-Neville Co., The
Lester Corp.
Littleton Electric Company, The
Littleton Steel, Inc.
Lubriplate Division
Marlow Pumps
Master Vibrator Company
Michigan Power Shovel Company
Minneapolis-Moline
Naugatuck Chemical Division
Noble Company
Oliver Corporation, The
Omaha Standard
Onan, D. W., Sons, Inc.
Ogallala General
Ottawa Steel Products, Inc.
Owen Bucket Co., The
Pacific Car and Foundry Company
Page Engineering Company
Philadelphia Textile Finishers, Inc.
Phoenix Products Co.
Pittsburgh Engineers' Works
Pitman Manufacturing Company
Porter, Inc., H. K.
Republic Steel Corporation
Riddell Corp., W. A.

Rogers Brothers Corporation
St. Paul Hydraulics Hold
Sibley, C., Company, The
Sauermaier Bros., Inc.
Schramm, Inc.
Service Supply Corporation
Servicized Products Corp.
Shunk Manufacturing Company
Standard Steel Corporation
Sterling Engineering & Mfg. Co.
Slow Manufacturing Company
Summer Equipment Limited
Super-Compactors, Inc.
Symons Clamp & Manufacturing Co.
Syntron Company
Talbert Construction Equip. Co.
Tamm, C. G., Inc.
Thurman Machine Co., The
Timken Roller Bearing Co., The
Titan Chain Saws, Inc.
Transport Trailers, Inc.
Tuthill Spring Company
Universal Engineering Corp.
Vibro-Plus Products, Inc.
Vulcan Tool Manufacturing Co.
Warner & Swasey Co.
Waterloo Foundry Co., Inc.
Waukesha Motor Company
Waukesha Engineering Co., The
Whitestown Tractor Co., Inc.
Wico Electric Company
Williams Farm Engineering Corp.
Winter-Waia Co., The
Wyoming Valley Equipment Co., Inc.
Yawn Manufacturing Co., Inc.



REMAKING A RIVER BED. The channel of the Arkansas River is being realigned by this fleet of International crawlers owned by the C. W. Kelley Transport Company, Inc., and Rush Construction Company, shown cutting new channel through section of island.

Speeds up Sleepy River





RIVER CROSSING. International crawlers reach islands to start rechanneling work by building earth ramps across the river. They worked in sand and water throughout the summer with no downtime.



CHANGING THE CHANNEL. Operator Kie Bayless says: "These TD-14As have more 'soup' than any other tractor their size. They just plain move more dirt."

International crawlers speed up flow of Arkansas River as safeguard for Kansas wheat belt

Flow of the long and lazy Arkansas River is being speeded up one-third along a 30-mile stretch in Reno County as a flood prevention measure aimed at safeguarding the rich wheat belt in this Kansas County.

When the river rises just six feet, and it does periodically, it spills all over the wheat fields and causes extensive damage.

But county officials feel they have a solution. This year they launched the first portion of a proposed three-year plan involving some \$50,000 expenditure each year for elimination of bad turns and islands in the river channel. This improvement will increase the flow of the river from 4.06 feet per second to 5.41 feet per second or more and it is felt this faster flow will be sufficient to keep the river in its channel.

Dirt moving for the first-year phase of the improvement is being handled by Rush Construction Company and C. W. Kelley Transport Company, Inc., with rugged red International TD-18A and TD-14A crawlers.

H. M. Dunswoth, job foreman, reports:

"We lug these TD-18As and TD-14As down all the time. They not only have the power and maneuverability to do a bang-up dirt moving job, but that high-speed reverse sure makes us money on this river job as lots of the dozing calls for long pushes. These Internationals, and some have been used for years, have worked over two months here under miserable conditions with absolutely no downtime."

Ask your International Industrial Distributor for details on the whole International line of money-making crawlers. Ask him, too, about his fast, ready service and speedy parts delivery. Get all the answers . . . you'll want International "Power that Pays" from now on!

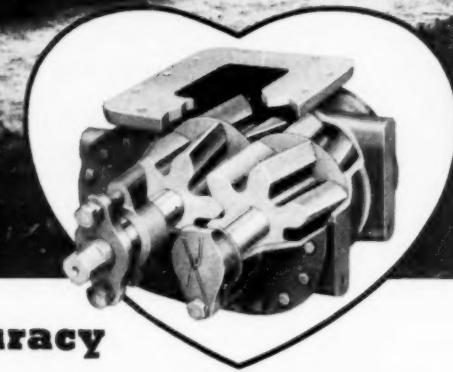
INTERNATIONAL HARVESTER COMPANY, CHICAGO 1, ILLINOIS



INTERNATIONAL

POWER THAT PAYS





**...one big reason for accuracy
and dependability of Etnyre "Black-Topper"**

Because the pumping requirements of a bituminous distributor are of a special nature, Etnyre found it necessary to design and build its own pump specifically to meet those needs.

As the "heart" of the extremely compact circulating system, the Etnyre Pump forces material under constant pressure to the spray bar with an even, nonpulsating flow. Flow of material is metered with absolute accuracy from .05 to 3 gallons per square yard. It never pumps more material than can be sprayed.

With suction on top and discharge at bottom,

pump is self-draining. There is no low point to trap material . . . material flows straight through! As you can see from the cutaway, there are least possible metal-to-metal surfaces. That's why the Etnyre Pump is easier to turn with less power, especially in cold weather, or when pumping heavy materials. Dozens of other features have established the Etnyre design as the most practical pump known. Get complete details on this and other Etnyre advantages from your nearby dealer, or write E. D. Etnyre & Co., Oregon, Illinois, U.S.A.

SEE YOUR ETNYRE DEALER

ETNYRE
"Black-Topper"
BITUMINOUS DISTRIBUTORS



This bulldozer's middle name is

WORK



Repairing a break in the Tule River Levee, near Stratford, California, this Cat* D6 Tractor with a No. 6S Bulldozer handles 400 yards of fill a day. And it works *all day and every day.*

When a contractor wants to get a job done he uses equipment he can depend on. Caterpillar-built Bulldozers are that kind of equipment. Over any period of time their production records prove it.

Here's a rugged, clean-cutting blade, scientifically designed to roll earth instead of pushing it. Bigger blade loads are delivered without spilling or clogging cable sheaves. Heavy, box-type construction gives the 'dozer extra strength, prevents warping in tough material. And Caterpillar Cable Controls are positive acting, easy to operate and trouble-proof.

Your Caterpillar Dealer can supply the widest range of blade types in the industry, and he backs every piece of equipment he sells with prompt, reliable service and genuine parts. Ask him for a practical, on-the-job demonstration today.

Caterpillar Tractor Co., Peoria, Illinois.

CATERPILLAR*

*Both Cat and Caterpillar are registered trademarks—®

NAME THE DATE...
YOUR DEALER
WILL DEMONSTRATE

Virginia contractor gets double value from his 2 Tournapull prime-movers

ROBERTSON, BOLEN & FOWLER, Inc., Buchanan, Virginia, had to handle both scraper dirt and shovel rock when they widened 3.8 miles of U.S. 11 between Staunton and Lexington. They held equipment inventory to a minimum, but kept maximum job efficiency by making their 2 D Tournapulls do "double duty". These 2-wheel, 122 h.p. prime-movers were used to power both 7-yd. Scrapers and 9-ton Rear-Dumps.

With Scrapers, deliver 10 loads hourly on 1700' cycles

Hitched to the Scrapers, the 2 D Roadster prime-movers helped move about 100,000 yards of clay, sand, gravel, and shale. In typical operation, each rig was push-loaded with 5½ pay yards in 20 seconds. Complete 1700' cycle took 5 minutes. That's 10 trips (55 pay yards of dirt) per 50-minute hour for each Scraper rig.

With Rear-Dumps, move 9 loads hourly on 2000' cycles

When rock was encountered, the Scrapers were detached and the prime-movers hitched to rear-dump Tournarockers. Change took only a few hours. As rear-dumps "D's" helped haul about 140,000 yards of shovel-loaded slate, feldspar and shale. Rigs' primary advantage in rock work was maneuverability. Loading from narrow hillside cuts, Tournarockers drove up to the shovel, turned 90°, and spotted in a few seconds. Conventional dump trucks, working in same cramped space, had to maneuver back and forth to get into cut. Tournarockers hauled rapidly, too. Despite heavy, open traffic (5,000 vehicles daily), they completed average 1500' cycles in 5½ minutes . . . 2000' cycles in 5½ minutes . . . 9500' cycles in 12½ minutes. Load time for 10 tons of rock averaged only 1½ to 2½ minutes at all times. And here's another advantage:

Work better in wet weather

"Tournarockers worked better in wet weather than other haulers," says Partner M. O. Fowler. "This equipment

is really all right! It hasn't given us any trouble on these tough hauling jobs."

Adds Operator H. C. Hite: "I like the way the 'D' turns in tight places. In wet going, you can cut cross-ways when you mire up and pull right out."

If you're interested in getting this kind of performance on your work, see your LeTourneau Distributor. He'll be glad to show you the "D" in action, either with a scraper or rear-dump. He can also tell you how the 122 h.p. "D" may be coupled to the interchangeable crane or flatbed, shown below.

"D" prime-mover also powers:



...or mounts



V-TYPE SNOW PLOW
9' wide, 4'8" high, mounts on same A-frame as dozer.



BULLDOZER BLADE
1 ¼ -yd. capacity, 3' lift.
Controlled electrically.



LeTourneau-Westinghouse Company

PEORIA, ILLINOIS



Power Scrapers for Dirt Coupled to 7-yard Carryall, this LeTourneau prime-mover hauled 10 loads (55 pay yards) of sandy clay per 50-minute hour. In 800 hrs., rig was 95% mechanically efficient.

**"D's" power
rear-dumps for rock
... scrapers for dirt**

Change to Rear-Dumps for Rock Same prime-mover, hitched to Tournarocker, worked in narrow quarters where ordinary trucks lost time turning and spotting. "D" can turn non-stop in 12'4" radius.

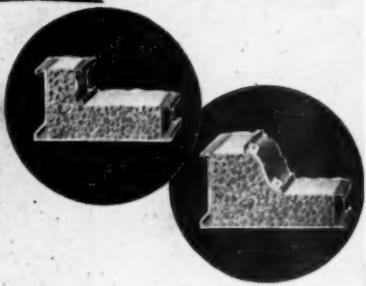
Tournapull, Tournarocker, Tournacrane, Carryall — Trademark Reg. U. S. Pat. Off. Tournahauler — Trademark DPR-225-H



Save this page . . .

. . . if the
**CONSTRUCTION OF
CURBS and GUTTERS
IS PART OF YOUR BUSINESS**

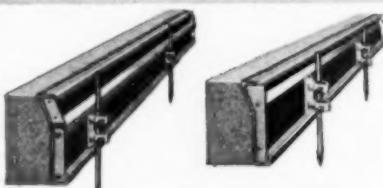
Heltzel Curb and Gutter Forms (with multi-style face) permit contractors to meet any cross sectional requirement. And optional methods of supporting face allow contractors to meet any construction specifications.



For almost 50 years Heltzel has been furnishing construction people with strong, quick-setting, fast stripping, versatile forms that make concrete forming easier, faster and less expensive. On this page is a sampling from the world's most complete line of modern steel forms . . . designed and built by the nation's leading manufacturer of forms for concrete construction.

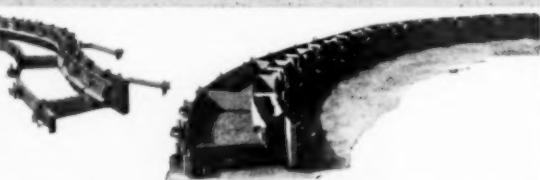


Two of the many variations possible with the popular Helco Basic Forms. These forms are designed to permit contractors to work on almost endless variety of curbing styles from the same basic set. All Helco Basic Forms are made of long lasting tough carbon manganese steel in 10' sections.



For curb work 12" to 24" in height, Heltzel has designed a heavy duty dowel joint form that has found ready acceptance in the field.

For partially battered curbs Heltzel can furnish either one or two piece front forms depending on your job requirements.



Heltzel builds a complete line of Radius Forms—either Rigid or Flexible. All forms are built to exact cross sectional specifications. Flexible Radius Forms are ideal for serpentine work for parks, etc.; Rigid Forms for repetitive curve pours where the radius is constant.

CONTRACTORS AND MUNICIPAL ENGINEERS: Today's high labor costs make the use of steel forms almost a necessity. You'll find that Heltzel can provide by far the widest variety of either standard or special forms.

If you don't already have Heltzel Form Bulletin L-20, get your copy today by writing The Heltzel Steel Form and Iron Company, Warren, Ohio.

—Naturally It's A—   **—Product—**

There's NO Tail Swing with **HYSTAWAY!**



... and that makes possible digging in closer quarters!

With the *Hystaway* you can dig right up against walls or other obstructions—in places where digging is impossible with shovels which must have "elbow room" to accommodate a swinging superstructure.

But whether you are digging close to obstructions—or out in open country—you always get full production with *Hystaway*. Only *Hystaway* offers: Full heavy-duty diesel tractor power; unimpeded crawler tractor mobility; mounting on *new* or *used* tractors; full production excavation and bulldozing with *one* piece of equipment... and compared to other shovels, can be used on more jobs. *Hystaway will put more profit into your operations!*

See your Caterpillar-Hyster Dealer, or write for Catalog 1235 to:

HYSTER COMPANY

2995 N.E. Cleckamas
Portland 8, Oregon

1895 N. Adams St.
Peoria 1, Illinois

HYSTAWAY®

OTHER SHOVELS



There is no "tail swing" because the boom is the *only* part that revolves.

... require extra room because superstructure swings outside of track.

**THERE'S PROFIT IN
HYSTER
POWER**

ONLY HYSTAWAY OFFERS ALL THESE MACHINES IN ONE!

DRAGLINE



1. DRAGLINE
2. SHOVEL
3. BACKHOE
4. CLAMSHELL
5. CRANE
6. PILE DRIVER
7. PLUS BULLDOZER



HYSTER COMPANY

FOUR FACTORIES: PORTLAND, OREGON; DANVILLE, ILLINOIS; PEORIA, ILLINOIS; NIJMEGEN, THE NETHERLANDS

**pick up
bigger
payloads**

**with
"KOEHRING
WORK
CAPACITY"**

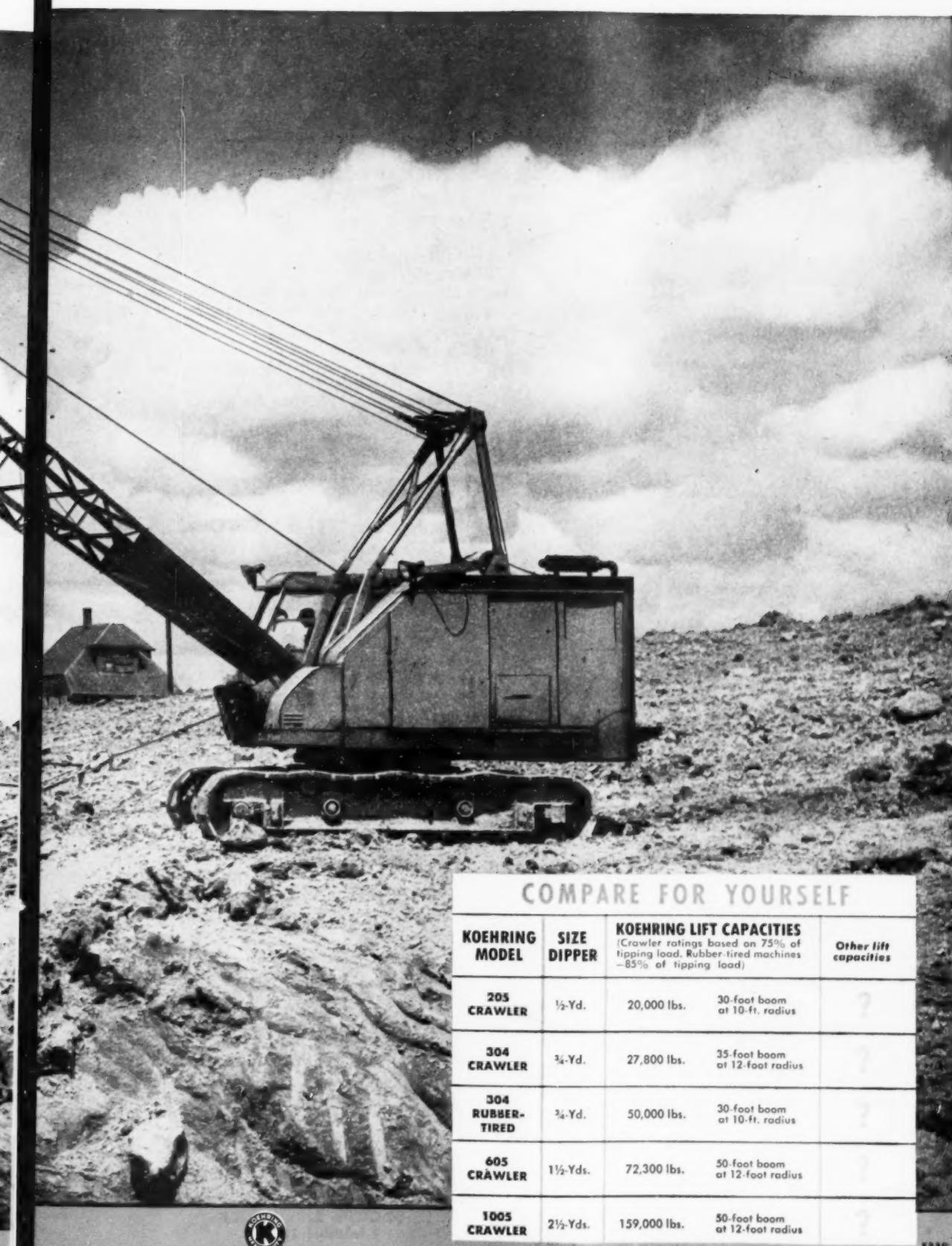
Big payload performance of Koehring cranes and excavators can be measured very quickly. Take a look at lifting capacities, for instance.

Obviously, the machine with the heaviest lift capacity not only picks up larger crane loads, it also has more power and stability to increase shovel or hoe production — handles bigger dragline and clamshell buckets on a wider work range.

Check lift ratings and other clear-cut measurements of "KOEHRING WORK CAPACITY", to insure biggest payload performance on all of your jobs. See Koehring distributor for all the facts.

KOEHRING COMPANY Milwaukee 16, Wis.

Subsidiaries: JOHNSON
PARSONS • KWIK-MIX



COMPARE FOR YOURSELF

| KOEHRING MODEL | SIZE DIPPER | KOEHRING LIFT CAPACITIES | | Other lift capacities |
|------------------|-------------|--------------------------|-----------------------------------|-----------------------|
| 205 CRAWLER | 1/2-Yd. | 20,000 lbs. | 30-foot boom at 10-ft. radius | |
| 304 CRAWLER | 3/4-Yd. | 27,800 lbs. | 35-foot boom at 12-foot radius | |
| 304 RUBBER-TIRED | 3/4-Yd. | 50,000 lbs. | 30-foot boom at 10-ft. radius | |
| 605 CRAWLER | 1 1/2-Yds. | 72,300 lbs. | 50-foot boom at 12-foot radius | |
| 1005 CRAWLER | 2 1/2-Yds. | 159,000 lbs. | 50-foot boom at 12-foot radius | |



X990

When writing advertisers please mention ROADS AND STREETS, July, 1953



WELLMAN *Williams Type* PERFORATED DRAGLINE BUCKET *speeds the wet jobs*

- You get big loads fast with this Wellman Perforated Dragline Bucket because excess water goes out while gravel stays in on jobs such as illustrated.

Built of special alloy steel—all welded for strength plus light weight. You can work faster with less maintenance with Wellman dragline buckets.

Want Facts?

Write for free descriptive bulletins.

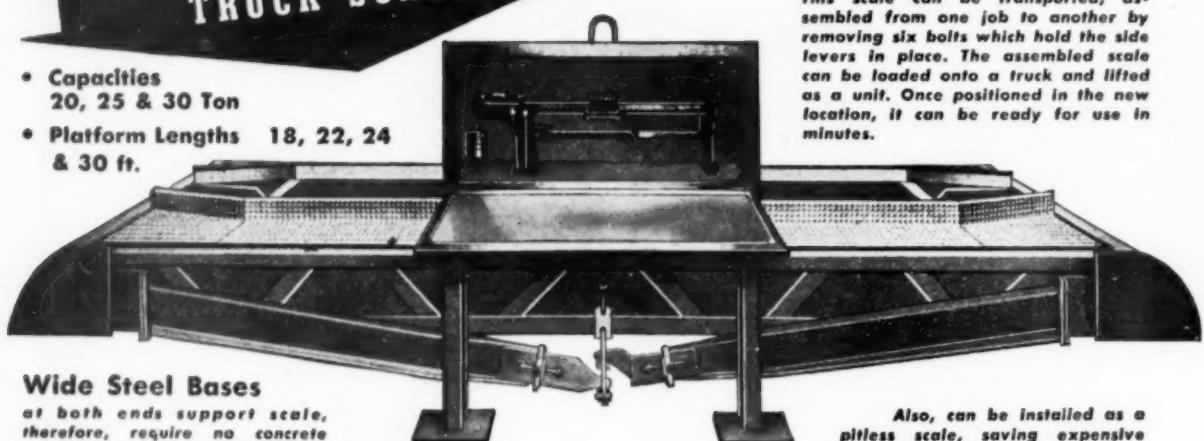
Dragline, Clamshell, Custom-Built Buckets, Stone and Wood Grabs.

THE WELLMAN ENGINEERING COMPANY

7000 Central Avenue • Cleveland 4, Ohio

THURMAN PORTABLE TRUCK SCALE

- Capacities 20, 25 & 30 Ton
- Platform Lengths 18, 22, 24 & 30 ft.



Wide Steel Bases

at both ends support scale, therefore, require no concrete footing. Easy-to-read weigh-beam is chrome-plated. Other vital parts electro-plated against erosion.

The Thurman Line Includes:

- Pit Scales up to 50-Ton capacity
- Pitless Scales • Batching Scales • Liquid Weighing Scales • Wheelbarrow Scales • Warehouse Scales • This and other weighing equipment in sizes to fit your requirements

THIS SCALE CAN BE MOVED FROM JOB TO JOB, AS A UNIT

Accurate and Portable

This scale can be transported, assembled from one job to another by removing six bolts which hold the side levers in place. The assembled scale can be loaded onto a truck and lifted as a unit. Once positioned in the new location, it can be ready for use in minutes.

Also, can be installed as a pitless scale, saving expensive concrete pit-construction costs.

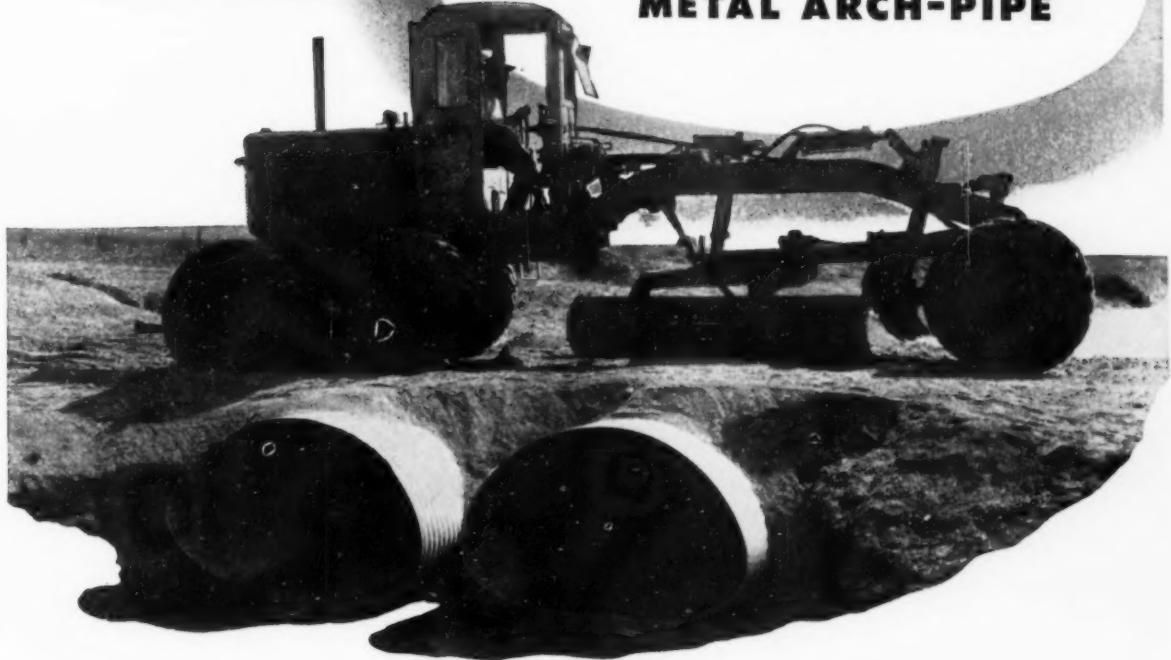
THURMAN MACHINE CO. (Scale Division)

Established 1918

156 North Fifth Street, Columbus, Ohio

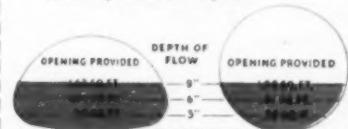
**Handle heavy run-off with
low headroom . . .**

**thru TONCAN IRON
CORRUGATED
METAL ARCH-PIPE**



HERE'S HOW

Toncan Iron Corrugated Metal Arch-Pipe is able to handle a much greater volume of water than a full round pipe of equivalent size and cost. Note greater cross-section area of Arch-Pipe at each depth.



Where shallow fill encounters heavy run-off, solve both problems with the greater cross-sectional feature of Toncan Iron Corrugated Metal Arch-Pipe, diagrammed at left.

Get all the advantages of Toncan Iron Metal Drainage Structures . . . free-flexing under shifting subsoil and backfill, freedom from erosion and spalling which reduce the water-carrying capacity of non-ferrous structures, easy low-cost installation anywhere in any weather with unskilled labor.

Toncan Iron contains twice as much rust-resisting copper as ordinary copper-bearing steels and irons . . . plus just the right amount of molybdenum to make the copper do its best work. Install Toncan Iron Metal Drainage Structures. Then forget them for a lifetime.

The Toncan Iron Manufacturers listed below can give you "specs" and data covering all types of Toncan Iron Metal Drainage Structures. Or write to:

REPUBLIC STEEL CORPORATION • GENERAL OFFICES: CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N.Y.

Toncan Iron Drainage Products include: Corrugated Metal Pipe • Perforated Corrugated Metal Pipe • Sectional Plate Pipe • Sectional Plate Arches • Corrugated Metal Arch-Pipe • Sectional Plate Arch-Pipe • Corwel Subdrainage Pipe • Bituminous Coated and Paved Pipe



Manufacturers of Toncan Iron Drainage Products

BEALL PIPE & TANK CORPORATION
PORTLAND, ORE.
BOISE, IDAHO
BENGER METAL CULVERT CO., INC.
WESTMINSTER STATION,
VERMONT
THE BOARDMAN CO.
OKLAHOMA CITY, OKLA.
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BLUEGRASS PIPE & CULVERT CO.
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CENTRAL CULVERT CORPORATION
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WYATT METAL & BOILER WORKS
DALLAS, TEX.
HOUSTON, TEX.

GULF PRODUCTS and FINE SERVICE

keep equipment rolling

on New York's "Superpier" Project



Merritt-Chapman & Scott Corporation, and Corbett Construction Company, Inc., both of New York City, share the contract for construction of the substructure and deck for new Pier 57 at 15th St. on New York City's west side. Unique design of the pier includes three watertight concrete boxes, the buoyancy of which will support 90% of the total dead load. This photo shows the boxes in place, with Manhattan in the background.

New standards of efficiency and ingenuity were required on the part of the contractors to construct this new and larger pier on the site of old Pier 57.

They licked many a tough problem, and the story of this job, as published in leading construction journals, is well worth reading. However, they didn't have fuel or lubricant problems, because they selected the petroleum products identified by the familiar Orange Disc.

Leading contractors on all types of construction projects have found that it is good profit insurance as well as real economy to use Gulf lubricants and fuels. Always of the same uniform high

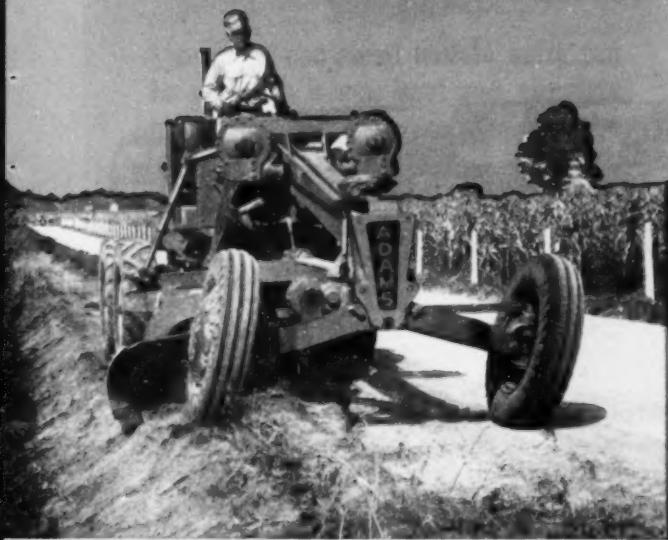
quality, they work as a team to help insure more hauls, fewer overhauls.

Write, wire or phone your nearest Gulf office today and arrange to have Gulf serve you on your next job.



Here, Mr. Highway Official,

is a practical, proved way to guard roads against ravages of winter weather



An **ADAMS** Motor Grader and an **ADAMS** TraveLoader Restore Good Drainage at Low Cost

Beat winter to the punch this year. Restore good drainage to your roads now—paved and unpaved—with an Adams Motor Grader-TraveLoader team...and watch them come through with less break-up next spring. The Adams Motor Grader cleans out side ditches and cuts off high shoulders, quickly, easily. The Trave-Loader then picks up all surplus windrowed material, loading at a truck-a-minute clip.

With good drainage reestablished, the subgrade will be stabilized and the road surface far less subject to chuck holes. There will be substantial savings in surface material, too—less filling on stone and gravel roads, less patching on blacktop and paved roads.

Yes, an Adams Motor Grader and TraveLoader make

a great road-saving team—give you better, longer-lasting roads the whole year around. Ask your local Adams dealer for complete information.

J. D. ADAMS MANUFACTURING CO., INDIANAPOLIS, IND.



• The Adams Trave-
Loader also loads effi-
ciently from stockpiles
—handles gravel,
crushed stone, sand,
top soil, cinders, oil-
mix material, etc., with
real speed and ease.



Motor Graders



TraveLoaders



Pull-Type Graders

WHITE 3000 Fleet Speeds Spreading...Cuts Hauling Costs



REPORT FROM SPOKANE—Lower hauling costs, faster work with the White 3000!

And it's the same story from coast to coast!

Tailored right to the job, the White 3000 design adds new efficiency and economy throughout the construction industry . . . like this fleet of White 3026's owned by Curtis Gravel Co., Spokane, hauling and spreading materials for highway surfacing.

Find out how many ways White Trucks can cut *your* costs . . . speed *your* work. See your White Representative today.

30 MINUTES FOR 13-MILE, 13-TON LOAD

Curtis Gravel Co. boosted payload within legal limits from 10 to 13 tons when this fleet of Whites went into service. These bottom dump spreaders are on continuous service from loading at the hopper to spreading station—30 minutes a round trip. High maneuverability and plenty of Mustang power save time on tight schedules.



THE WHITE MOTOR COMPANY • Cleveland 1, Ohio

For More Than 50 Years The Greatest Name In Trucks

When writing advertisers please mention ROADS AND STREETS, July, 1953



"**You get FAST ACTION —
to the job...on the job"**

**... with Cleaver-Brooks
oil and bitumen heating equipment!**

**These self-contained mobile units can
be ready to pump, heat and circulate
bituminous materials in 20 minutes or
less after arrival**

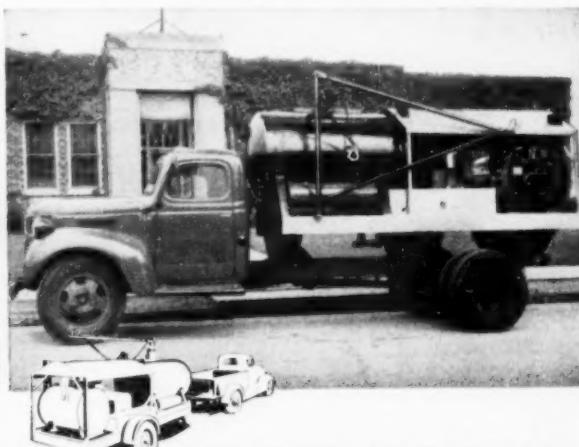
If your job can be reached on wheels, any one of these famous Cleaver-Brooks mobile heating units can save you plenty of time and money. Each can be transported as easily as you drive your car . . . put into operation with minor connections — by only one man! Their proven high efficiency, man hours saved, plus elimination of field problems can be important factors in your profit picture. That's why you'll want to know more about famous Cleaver-Brooks Tank-Car Heaters . . . Pumping Boosters . . . and "Deuce" combination tank-car heater and pumping booster. It's the mobile bituminous team that does more work . . . with faster heat, higher temperatures and with less fuel. Write for details. Cleaver-Brooks Company, Dept. H, 395 E. Keefe Ave., Milwaukee 12, Wisconsin.



TANK CAR HEATER — Shoots steam through tank-car coils at 125 lbs. pressure in 20 minutes or less from a cold start. Can be kept going at full tilt all day. Oil firing plus extra high-heat transfer design, assure extra fuel savings. Turbine-type condensate return means less water required. Available in two-car (28 BHP) and three-car (42 BHP) sizes, trailer and skid-mounted models. Ask for Bulletin RM-110.



PUMPING BOOSTER — Heats by direct firing 4 times as fast as steam, recirculates, then delivers bituminous materials directly to distributor. Heats only the amount of material required — not necessary to heat entire car. No steam or water required for operation. Has self-contained fuel and gasoline tanks. Available in two sizes, trailer and skid mounted: No. 1A Booster heats approx. 300 GPM temp. rise 25°-35°F; No. 2 Booster heats approx. 350 GPM temp. rise 45°-55°F. Ask for Bulletin RM-107.



**"DEUCE", COMBINATION TANK CAR HEATER AND
PUMPING BOOSTER** — It's a portable steam boiler and direct-fired heater mounted on a single frame. Look at this three-job versatility! "Deuce" steam preheats one car to pumpable consistency while circulating and heating a second car to application temperatures. Same unit also pumps and loads distributor or transfer truck. Ask for Bulletin AD-104.

Cleaver-Brooks

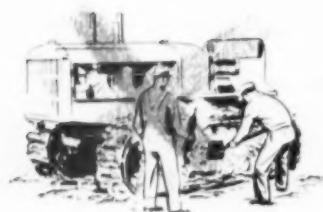


Pioneers and Originators of Self-Contained Boilers, Tank-Car Heaters, Pumping Boosters, The "Deuce" and "Peak-Temp"

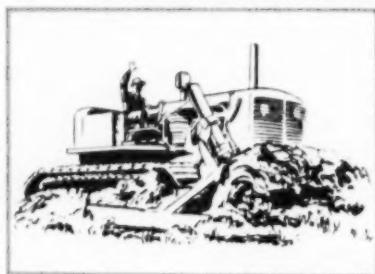
Advance design features make Allis-Chalmers Tractors performance leaders

It takes truly modern equipment to keep pace with today's stepped-up demands — and do it at an operating cost which insures fair and consistent profits. The line of Allis-Chalmers crawler tractors has been designed and built completely new since the war, with the kind of advanced engineering that delivers big-capacity performance at a minimum of maintenance expense.

This forward progress is a continuing program. Additional improvements are constantly being incorporated into the HD-5, HD-9, HD-15 and HD-20 tractors. If you are in the market or just interested, see your Allis-Chalmers dealer for all the inside facts that have proved so popular with owners as well as operators and mechanics.



Daily Lubrication



1000-hour Lubrication

On all Allis-Chalmers tractors, you can operate six months on a 40-hour week basis with just one lubrication of truck wheels, front idlers and support rollers. Designed with positive seals and tapered roller bearings, these units are protected from dust, loose sand, soft ground, mud or water. You not only gain working time, but save labor and lubricant costs as well. And there's no costly damage from greasing neglect.

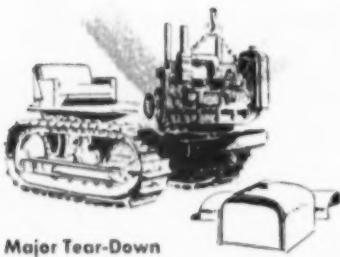


Ordinary Steering Clutches

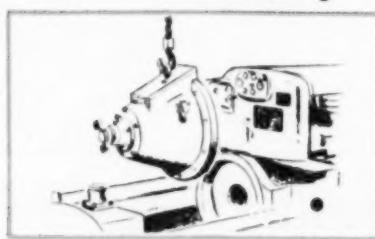


Hydraulic Steering and Self-Energizing Brakes

Allis-Chalmers HD-15 and HD-20 tractors are equipped with fingertip hydraulic booster steering — operator exerts only 3 to 5 lb. pressure on the controls. As a result he gets small tractor maneuverability from these 27,850 and 41,000-lb. crawlers and can concentrate on his work. All four models are equipped with self-energizing brakes. These require less pedal pressure and take hold with a firm, uniform grip for accurate control.

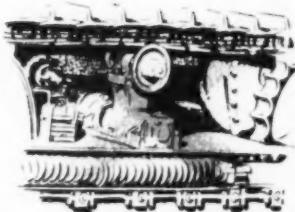


Major Tear-Down

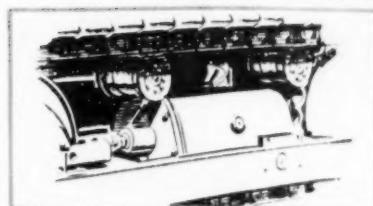


Unit Servicing

No need to remove transmission or engine, radiator, grille, etc., when servicing or removing an Allis-Chalmers master clutch. The unit assembly principle also applies to final drive gear, transmission, steering clutches, engine and truck frame. As a result, hours of costly service and down time are saved because of Allis-Chalmers advanced design.

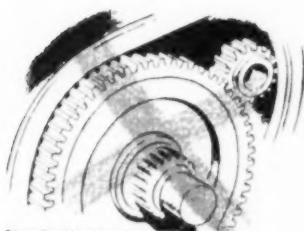


Open or Partly Shielded Track Release Mechanism

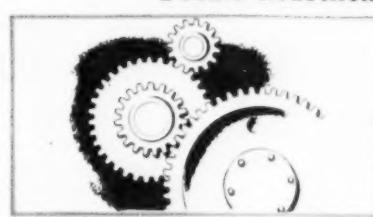


Oil Enclosed Track Release Mechanism

Operating in oil and sealed against dirt and moisture, the Allis-Chalmers track release mechanism seals out mud, ice and debris. Because it's completely sealed, the release mechanism is in working condition at all times — providing positive protection when obstacles jam into the tracks.

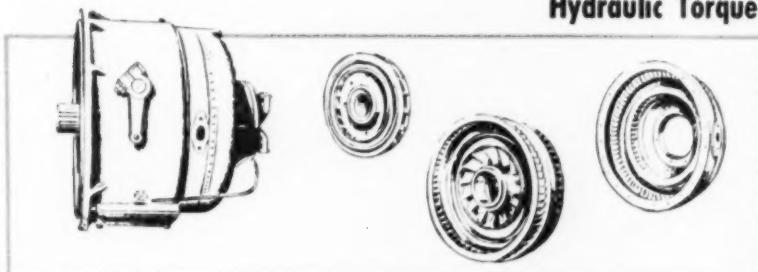


Single Reduction Final Drive



Double Reduction Final Drive

With smaller gears and shorter shafts, double reduction final drives provide better bearing and gear alignment. The "live" axle permits smaller, more serviceable seals. Equally important, double reduction drive provides for smooth, clean bottom construction and the extra ground clearance so necessary on rough terrain.



Hydraulic Torque Converter Drive

The Allis-Chalmers HD-20 is the only crawler tractor in the industry where torque converter is standard equipment and part of the tractor's basic design. With torque converter there is greater pay load capacity because this unit automatically balances travel speed to the load — no idle horsepower, no worry about engine stalling. And with most shifting eliminated, there's far less operator fatigue.



ALLIS-CHALMERS
TRACTOR DIVISION — MILWAUKEE 1, U.S.A.

RUGGED "Individuals"

THAT'S THE **BUCYRUS
ERIE** LINE OF
3/8- TO 4-YARD EXCAVATORS . . .



| | |
|------|---------------|
| 10-B | 3/8-Yd. |
| 15-B | 1/2-Yd. |
| 22-B | 3/4-Yd. |
| 22-B | Transit Crane |
| 38-B | 1 1/2-Yd. |
| 51-B | 2-Yd. |
| 54-B | 2 1/2-Yd. |
| 88-B | "4-Yd. |

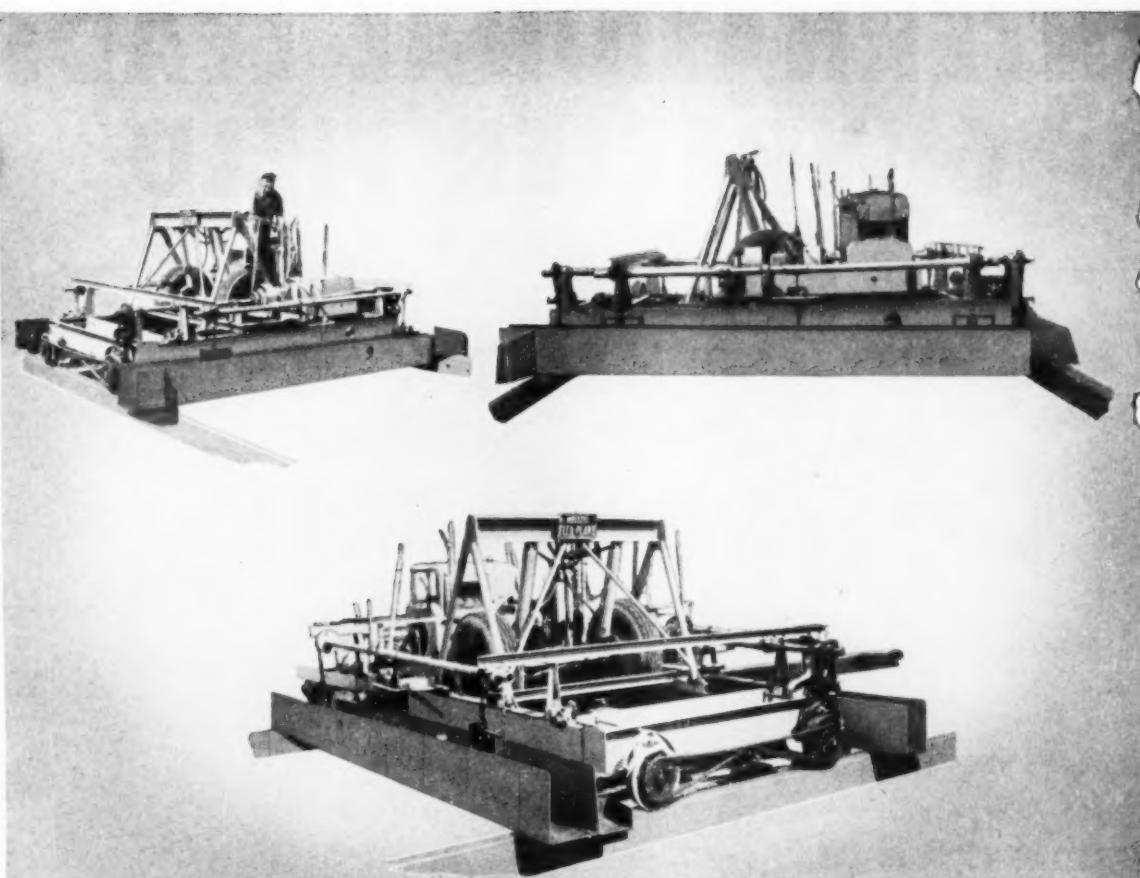
* Each model is *individually designed* all the way through from crawler treads to boom point sheaves for a definite size payload. Maximum stability and strength are obtained without the extra weight that slows down the operating cycle or adds to power consumption. No parts are too small — strength is built in where you need it. No parts are too big — bulky deadweight is eliminated. This is Bucyrus-Erie *individual design*.

Because of *individual design* you can always be sure that your Bucyrus-Erie excavator will work to capacity with speed, safety, and at low maintenance cost. Ask your nearby Bucyrus-Erie distributor to give you complete details.

17653

BUCYRUS-ERIE COMPANY

SOUTH MILWAUKEE, WISCONSIN



YOU'RE LOOKING AT THE MOST MOBILE CONCRETE FINISHER IN THE WORLD . . .

Here are three views of one of the most heralded machines in highway and airport construction history. It's the super portable Flex-Plane Detroit Special Finishing Machine.

Wherever one of these machines is in operation you'll discover the contractor using

the machine has been able to work faster at less cost.*

Completely portable, the machine will lift itself from the forms and convert itself into a "trailer" in a minute . . . ready to be taken to the next job with a minimum of make-ready and idle crew time.

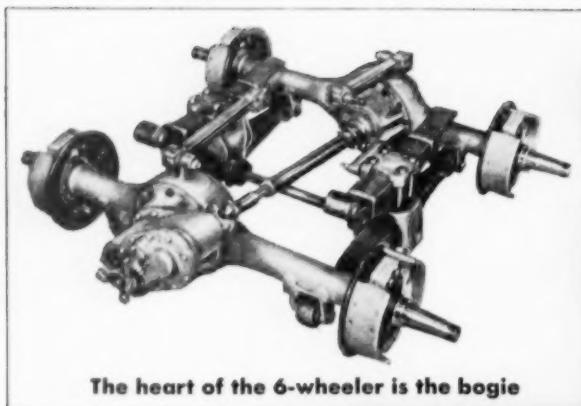
THE SUPER PORTABLE FLEX-PLANE DETROIT SPECIAL

Special screeds and screed mounts enable this speedy machine to finish any type surface in the manner specifications call for. Both screeds are mounted outside the frame which permits faster screed changes. Machine is telescopic . . . can be altered to fit any size job in approximately 15 minutes. If you are in the business of building concrete streets, highways or landing strips, you can't afford to overlook this cost-cutting finisher. To get all the facts drop a note on your company letterhead to the Flexible Road Joint Machine Company, Warren, Ohio, today.

* Ask for name of contractor nearest you operating a Detroit Special — talk to him about the quality of work, the speed and the savings he has been able to get by using this great machine.

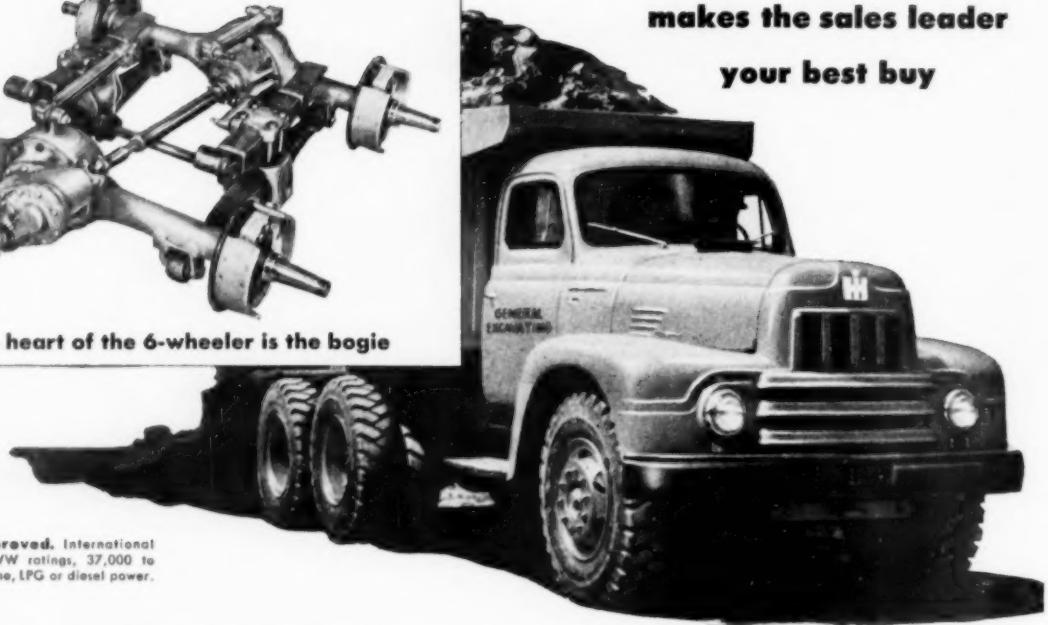


INTERNATIONAL LEADS 6-WHEELER FIELD



The heart of the 6-wheeler is the bogie

**Proved performance
makes the sales leader
your best buy**



Performance proved. International RF-210 Series, GVW ratings, 37,000 to 45,000 lbs. Gasoline, LPG or diesel power.

"Tough Job" engineering has made International Trucks the heavy-duty sales leader for 21 years. International 6-wheelers give you proved performance **PLUS** the famous International bogie with the third differential.

INTERNATIONAL BOGIE ADVANTAGES

The third differential and power divider allow each wheel to rotate independently. There is practically no tire scuffing, "axle fight" or power loss. Perfect matching of tires is unnecessary. Fuel consumption is lower. Under adverse conditions, the third differential can be locked out, giving positive traction to both axles.

Abnormal tire wear eliminated because International bogie design *always* keeps wheels parallel to frame.

Reduces road shock by 50%. "Walking action" design keeps chassis frame and body level while bogie "walks" over obstructions and levels out the road.

Extra strength without extra weight. More payload per pound of chassis weight results from elimination of

unnecessary dead weight. Strength is concentrated where needed.

Load stresses equalized. Load is carried from the frame to the axles at **four points**.

Compare performance . . . value . . . and price. Get all the facts on International 6-wheelers—proved for top performance and greater operating economy—from your International Dealer or Branch today.

INTERNATIONAL HARVESTER COMPANY • CHICAGO

23 NEW 6-WHEEL MODELS

GVW ratings, 22,000 to 90,000 lbs. Engines from 130 to 356 horsepower. Choice of gasoline or LPG fuel systems. Diesel engines available for models with GVW ratings of 30,000 lbs. and over. Transmissions, axle ratios to meet any requirement. America's Most Complete Truck Line—168 basic models from $\frac{1}{2}$ -ton pickups to 90,000 lbs. GVW off-highway models.



International Harvester Builds McCormick Farm Equipment and Farmall Tractors... Motor Trucks... Industrial Power... Refrigerators and Freezers

Better roads mean a better America

INTERNATIONAL TRUCKS

"Standard of the Highway"



TRU-LAY Preformed WIRE ROPE



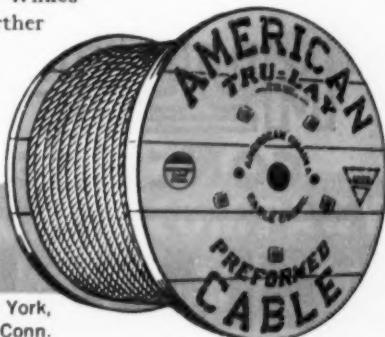
Why TRU-LAY "Green Strand" Stands Clamshell Punishment...

• TRU-LAY GREEN STRAND is made of improved plow steel to withstand the jerking, whipping, and twisting that punish clamshell ropes. The outside wires are large enough to take the abrasion caused by dirt particles imbedded in the rope. Preforming makes the wires last longer bending around the small sheaves.

The records for longer service established by TRU-LAY Preformed GREEN STRAND on all kinds of earthmoving equipment result from the use of the one best construction and grade of wire rope for each particular job.

AMERICAN CABLE engineers check constantly to keep TRU-LAY rope constructions abreast of changing machine designs. That's why you can rely on TRU-LAY recommendations.

Insist on and get TRU-LAY Preformed GREEN STRAND improved plow steel wire rope for every machine you operate. You can identify it by the green strand. Call your AMERICAN CABLE distributor today or write our Wilkes-Barre office for further information.



ACCO



AMERICAN CABLE DIVISION
AMERICAN CHAIN & CABLE

Wilkes-Barre, Pa., Chicago, Denver, Houston, Los Angeles, New York,
Odessa, Tex., Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

**There are
more MultiFoote
Pavers in service
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make!**

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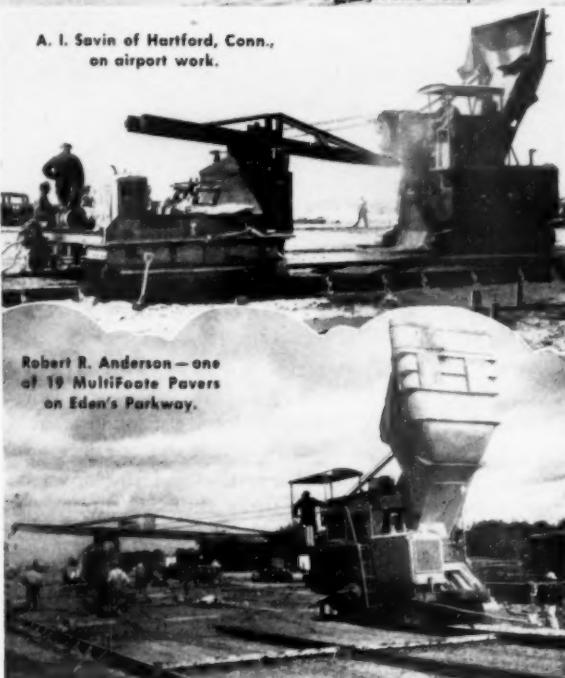


John Arboro on the Taconic Parkway, Poughkeepsie, N.Y.



Williams Paving Co., Norfolk, Va.,
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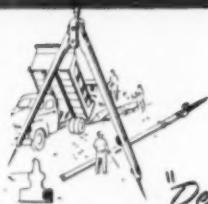
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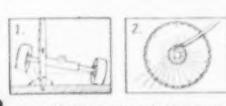
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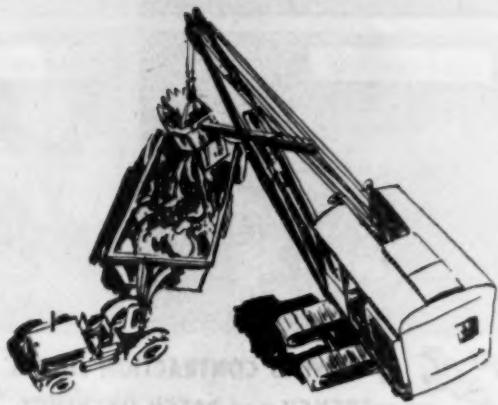
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Roads and Streets in the News

Minnesota legislature orders road study

Minnesota road finances are to be reviewed by a special committee created by legislative act. To consist of seven members from each legislative house and seven citizens, the committee will dig into the question of whether secondary roads should have a larger share of funds. This question has been hotly debated in recent months, with legislators from rural areas and rural-minded organizations campaigning actively for more local road funds. The committee was voted \$60,000 for its work.

The committee has broad powers, being directed to "make a comprehensive, detailed and complete investigation of all the factors contributing to a sound highway policy for the state, including, but not limited to, the adequacy of existing highways, the need for additional funds, the adequacy of present taxes for highway purposes, weights and lengths of trucks and wear and tear caused by trucks and busses upon public highways of the state, toll roads and turnpikes." Also the present distribution of taxes for highway purposes and the need for revision. The committee's work to cover all classes of roads and streets within the state.

The committee is empowered to subpoena witnesses and records, and the law directs that state, county, township and municipal officials must cooperate. A report is to be made by March 15, and a final report by December 15, 1954.

Beside this action, the legislature in Minnesota also voted permission for the state highway department to hire consulting engineers for the dozen major bridge projects programmed at \$20 million cost.

Connecticut votes new \$213 million toll road

Connecticut on May 22 joined the toll road building states, when Governor John Lodge signed a bill authorizing immediate construction of a 130-mile trans-state project. To cost \$213 million, it will be the biggest road job ever undertaken by the Connecticut State Highway Department, which is to be the directing agency.

The new expressway will extend from New York to Rhode Island. Under the new law the state highway commissioner is "authorized and directed to plan and construct forthwith" an expressway beginning at the New York line near Port Chester, New York, running generally northeast to New Haven, and from there

easterly over the Raymond E. Baldwin Bridge in Old Saybrook, to a point at or near the East Lyme-Waterford town line. It will then go north easterly to Norwich and to the Rhode Island line in Killingly.

Michigan Road Builders elects officers and directors

C. Edward Frisinger of Ann Arbor was elected President of the Michigan Road Builders' Association at their annual meeting, held April 7 and 8, in Grand Rapids. Other officers elected were: Harold J. Taber, Grand Rapids, Vice-President; A. M. Della-Moretta, St. Ignace, Upper Peninsula Vice-President; and Charles Sudgen, Oak Park, Secretary-Treasurer. Mr. C. J. Carroll, Lansing, is Executive Secretary.

N. J. turnpike reports 29.6% traffic increase

Traffic on the New Jersey Turnpike in the first three months of 1953 showed an increase of 29.6 percent compared to the same period in 1952, according to a report to the bondholders by the Commissioners of the Turnpike Authority. A total of 4,084,500 vehicles used some part of the Turnpike in the first quarter, paying \$3,590,000 in tolls.

The Commissioners state that the safety record on the Turnpike for the first three months of this year reflects improvement over that in 1952, particularly in view of the greater traffic. Accidents on the Turnpike were equal to 66 per 100 million miles

of vehicular travel. In the same period a year ago the rate was 114.8 per 100 million miles which compared with an average of 480 on the State's parallel public highways based on the latest figures available.

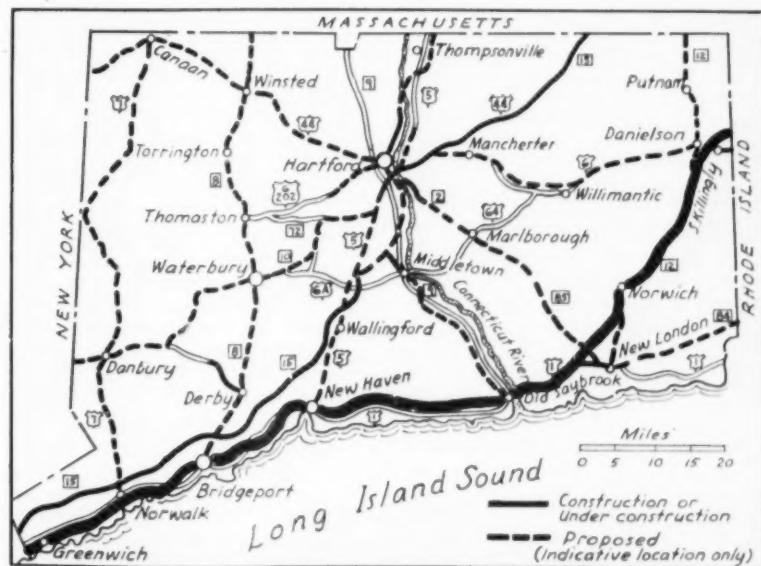
Fatality rate for the Turnpike in the first three months of 1953 was 3.84 per 100 million miles compared to about 6 on the parallel highways and 7.3 for all highways in the nation last year.

"The adoption of new measures to insure greater safety, together with the augmenting of the State Police detachment on the Turnpike, have contributed measurably to improvement in the safety record," state the Commissioners. "Studies are continuing of all new and proven devices to insure the utmost in safety to patrons of the Turnpike."

Regional traffic control plan tried this summer

Of interest to highway planners and traffic safety engineers is the co-ordinated drive to be made this summer by officials in eleven eastern states. Designed to control speeders and keep down the summer bulge in traffic accidents, the program will enlist police, judicial and safety officials in the New England states, New York, New Jersey, Pennsylvania, Delaware and Maryland.

According to a newspaper report by James Barrett, director, police bureau, New York state division of safety, this is not to be a "speed trap" campaign, but is however designed to achieve a general slow-down among speeders.



★ Route of the new express toll road voted in Connecticut shown in heavy line



New Runway for Porto Rico's International Airport

A new 7,000 x 200 ft. concrete runway and related taxiways have been completed at Porto Rico International Airport, located at Isle Verde, just out of San Juan. The paving, 11 and 13 in. thick, was built to modern U. S. standards by Zegers & Pinero, Porto Rican contractors.

The \$15 million cost for airport development including new buildings is financed one-third by U. S. funds under this country's "Operations Bootstrap" program of industrial development. Clearing, grading and drainage were

performed by Blythe Mills Co., of South Carolina, using company trained foremen and native labor for much of the work. Blaw-Knox equipment engineers from Pittsburgh helped instruct the paving contractor's crew in the modern concrete paving technique.

The field was built under the Porto Rico Transportation Authority, Salvador V. Caro, general manager, and Rafael Sjeljo Tizol, chief of engineering. Air traffic through the San Juan terminal is exceeding 500,000 passengers annually.

A proclamation signed by the governors of these states was issued, stating, "We are determined to reduce traffic deaths and injuries during the coming vacation season, and have agreed to concentrate upon strict control of highway speeds as the most effective step toward that objective."

Obstacle to straits bridge removed in Michigan

The \$66 million in contracts awarded this spring for a suspension bridge across the Straits of Mackinac are given the green light by legislative action assuring the \$417,000 annual appropriation for maintenance of the completed bridge. The financial advisors had held up the job (described in Roads and Streets, April, 1953) over this detail. Merritt-Chapman & Scott Corp. was awarded the sub-structure and American Bridge Company the superstructure, which will be 8,267 ft. long and involving a 3,800 ft. suspension span exceeded in length only by the Golden Gate Bridge span.

Dougherty heads "The Moles"

Richard E. Dougherty, consulting engineer who was for 49 years in the service of the New York Central system, was elected president of The Moles, an association of tunneling and heavy-construction men, at their annual meeting. He succeeds David Bonner, Vice President of Frederick Snare Corporation.

Other officers elected were: George F. Ferris of Raymond Concrete Pile Company, first vice president; William A. Durkin of Walsh Construction Company, second vice president; Theodore M. Avery of Blaw-Knox Company, sergeant-at-arms; Harry T. Immerman of Spencer, White and Prentiss, Inc., secretary, and Edward G. Johnson of the Arthur A. Johnson Corporation, treasurer.

Four men were elected to three-year trusteeships: William Denny of Merritt-Chapman & Scott Corporation; Frank P. Di Menna of Nicholas Di Menna and Sons, Inc.; Harry J. Hush of Griffin Equipment Corporation, and Richard M. Johnsen of the Foundation Company.

Michigan turnpike authority authorized by legislature

A five-man turnpike authority is created by an act passed by the Michigan state legislature and signed by the governor late in May. The authority with four of the five members to be non-partisan appointments is empowered to construct toll roads between Toledo, Detroit and Bay City, and between Detroit and Chicago, and issue bonds for that purpose. It also may study the advisability of other toll routes, but must obtain further legislative authorization for their construction.

Army engineer laboratory develops Arctic cable

All-weather, rubber-jacketed electric power cable for Arctic use has been developed by the Engineer Research and Development Laboratories, Fort Belvoir, Virginia.

The new military cable, which also operates successfully under tropic and temperate conditions, remains flexible at temperatures as low as minus 65 degrees Fahrenheit. Unlike standard commercial cables which tend to act like springs when frozen, it can be uncoiled with no danger of snapping back. It does not become brittle at low temperatures nor as stiff as commercial cable.

Dr. Hognestad joins Portland Cement Assn.

The Portland Cement Association has announced the appointment of Dr. Eivind Hognestad, former faculty member of the University of Illinois, to the staff of its Research and Development Division.

Well known in the United States, Canada and Europe for his work in the field of reinforced concrete and structural engineering, Dr. Hognestad has been appointed Manager of the Structural Development Section of the Association's Development Department. He succeeds C. C. Carlson, who has been appointed Manager of a newly formed Products and Applications Section.

Both appointments were announced by Dr. A. Allan Bates, Vice President for Research and Development of the Association, as part of an enlargement and reorganization of its Development Department.

New books

"Prestressed Concrete." By Kurt Billig, Dr. Ing., Professor of Civil Engineering and Director of Central Building Research Institute of India; 470 pp. D. Van Nostrand Company, Inc., 250 Fourth Avenue, New York, N. Y. Price \$9.00.

The Challenge of Our New Productive Capacity

• Even contractors and engineers are often not fully aware of the high level to which the nation's capacity to build and maintain roads has been stepped up since the war. If the law-makers will just give us the funds and the administrative machinery, we can move rock and earth and build pavements and bridges at a pace that would dazzle road-builders of the '20's. It would even surprise many contemporaries whose experiences are still based largely on War II machinery models and post-war shortages.

This productivity is being shown on the little every-day jobs of patching and shoulder work, and all along the line. The most dramatic proof however is currently found on the big turnpikes. Despite the late start, the Ohio Turnpike contractors will make an impressive showing by the year's end. The earthmovers strung along 88 miles of mountainside on the West Virginia Turnpike will move 25 million cubic yards largely in a year's time. On the New York Thruway, the Garden State Parkway in New Jersey, and elsewhere, the brilliant pace is reminding the public that it needs only to vote "yes" on a road job or program. However big it is, roadbuilders can take it on.

• New performance records are not just the result of putting more equipment on the work. Numerically the fleets often are no larger than before. But, as Mr. McElmon of Euclid has pointed out [ROADS AND STREETS, April, 1953], output has been stepped up sharply by improved models. This has come about through increased power per yard of capacity, larger tires with better flotation, higher hauling speeds through better traction and improved transmissions, new operator comfort and convenience, and other refinements. Larger equipment, too, is seen more and more on jobs where it can be used to advantage, with the 20-yd. wagon and scraper and the 2½-yard shovel symbols of the times. Shovels of

3½-yard capacity are appearing on heavy road work.

In paving and stabilization, better equipment has brought increased job speed, although the advances have been less spectacular due to the many quality refinements concurrently being achieved.

In the small equipment field the post-war years have brought a veritable revolution, with air-cooled motor-equipped machines doing scores of new tasks to replace slow and costly hand-labor methods.

• Contractors can take pride in the part they have played in bringing about this increased efficiency under the spur of competition. They have worked constantly to improve job planning. Management on the job must always remain an art, calling for a special kind of alertness in the selection and hour-to-hour deployment of men and machines.

However, the contractor's hat needn't get too big. According to time studies made by the Bureau of Public Roads and released by the Highway Research Board, contractors still lose from one-third to one-half or more of their "good weather" machine time through job interruptions. Many little delays such as occur when a dragline waits on wagons, plague the superintendents.

The biggest single cause of production delays on the job, however, comes from a source that rests right in the boss' office. This cause is the stoppage of key machines for on-the-job repairs and maintenance. On the average, shovels are down 1.2 hours and tractor-scraper units 1.9 hours in each 10-hour "good weather" day, for this reason, according to stop-watch studies.

This finding is indeed a major piece of intelligence. Spurred by time-study revelation of a fact that seems so obvious, equipment makers today are putting a new emphasis on preventive maintenance—the "stitch-in-time" care of machines, so that job breakdowns will occur less often.

Here is a subject that needs re-examination by contractor management, which has often "left it up to Joe" without proper and constant follow-up.

Equipment manufacturers have gone to great lengths to devise maintenance techniques and prepare manuals for shop and field men. The trouble seems to lie in the peculiar prejudice of contractors against "too much paper-work." The follow-through is often poor, and vital steps in inspection and greasing are missed. Reports that could enable owners to trace and correct break-down causes are seldom or never made out in many companies. The company owner or manager thus loses an invaluable part of his potential "know how."

• So important is this subject of productivity of equipment and preventive maintenance that Harold F. Hess, executive vice-president of the Construction Industry Manufacturers Association, chose the subject for a talk at the recent Ohio Highway Engineering Conference. Mr. Hess, who is also a member of the new Special Committee on Highway Equipment of the Highway Research Board, quoted time-study figures which make an overwhelming case for tightening up machine-care programs on the job. Committee reports giving the details for shovel and scraper jobs are published elsewhere in this issue.

This is the first year in which contractors have had no hampering government controls or shortages to hold them back. New records are being set for contractor efficiency as well as for dollar volume.

But you can still go past many a job and find shovels, trucks, pavers, and other costly equipment standing idle while the sun is high, because someone didn't plan the work right.

At the job level, contractors are aware that they have a clear-cut opportunity to cut delays and further increase efficiency.

—Harold J. McKeever

IT COSTS LESS TO BUILD GOOD ROADS THAN TO HAVE POOR ROADS

Scaffolding with Built-in Stairs

Safety Feature on Buffalo Bridge Job

Scaffolding and forms designed by Bates & Rogers Construction Co. for safety, speedy handling and multiple re-use.

WHEN Bates & Rogers Construction Corporation, of Chicago, was awarded the substructure for the Buffalo High Level Roadway, this company's personnel knew they had a man-sized job of forming and form handling on their hands. The 3,800-ft. \$1,400,000 project included 25 piers ramping up to a maximum pier height of 95 ft. to take Fuhrmann Boulevard over the navigable Buffalo River on Buffalo's downtown lakefront.

The piers are designed as two-column reinforced concrete bents, with some piers having an intermediate tie-beam between footing tie

and top cross beam. The designers adopted vertical stepped-back surfaces rather than a batter, to achieve a pleasing architectural effect and also facilitate re-use of form panels. Three basic pier designs were employed. Eighteen of the shortest piers graduate from 8'0" to 7'0" and then to 6'0" square cross section, three intermediate height piers graduate from 12'0" to 10'4" to 8'8" section, and four of the tallest piers near the river are graduated 13'0", 11'0" and 9'0" square. All piers have recessed corners, adding to the good lines.

Four of the piers nearest to the

river required caissons 18 ft. in diameter. One pier, which straddled a railroad, was 16 ft. in diameter and another one was 12 ft. in diameter. The entire job required 3,800 cu. yd. of foundation concrete in the caissons. All piers which are not caissons are supported on steel H-piles up to 63 ft. in length. Caissons rest on rock, and H-piles were driven to rock.

Tubular Scaffolding Used

Forms and scaffolding for the pier shafts were designed with utmost safety in mind. The company in Chicago was able to purchase a supply of Safeway tubular steel free-standing scaffolding in long lengths. Panels 6½ ft. high were designed so that they would nest one on another, with the entire tier anchored together as a unit by sliding steel pins down through the vertical tubing. Tubular frames were connected by cross bracing, as shown in one of the photographs.

Platforms were constructed of wood flooring framed on four 2x6 stringers, with wood stairs and stair well built into each platform. The platforms were built sufficiently long to extend well out from the column, so that planks could be thrown across the ends enabling workers to reach all sides of the pier.

The platforms were anchored to the vertical scaffold tubing by means of "Jay" bolts welded to the tubing. Each scaffold section thus became a rigid frame, easily separated for dismantling from the frame beneath. The scaffolding was rigged up in Chicago and shipped to the job.

Safety engineers will note that the stairs were so designed that worker couldn't fall more than a single floor; each stair well is behind a stair flight. Wood railings were also provided, and the men were issued safety belts to use if they desired.

Sufficient scaffolding was fabricated ed to extend to the top of the tallest pier. Assemblies as high as 65 ft. high were handled at a time, using a Marion 372 crane equipped with a 100-ft. boom and 15-ft. jib, and also having extra wide and long crawlers for extra stability.

The pier forms themselves are



★ Marion 372 crane here is handling a 65-ft. high string of scaffold panels, complete with stairs and work floors

considerable interest. Designed for substantial re-use, the panels were made up of 2x8's with plywood lining. Universal spiral clamps were used to join the panels in position on erection.

Piers were usually concreted in three lifts, the two piers of a bent being carried up together, working from a construction bridge across the form tops. One unusually high pour of 45 ft was permitted. The work was organized wherever possible to permit a rapid "one-two-three" progression, forms being stripped from one pier while concreting was in progress on the next and forms and scaffolding being erected on the second pier ahead.

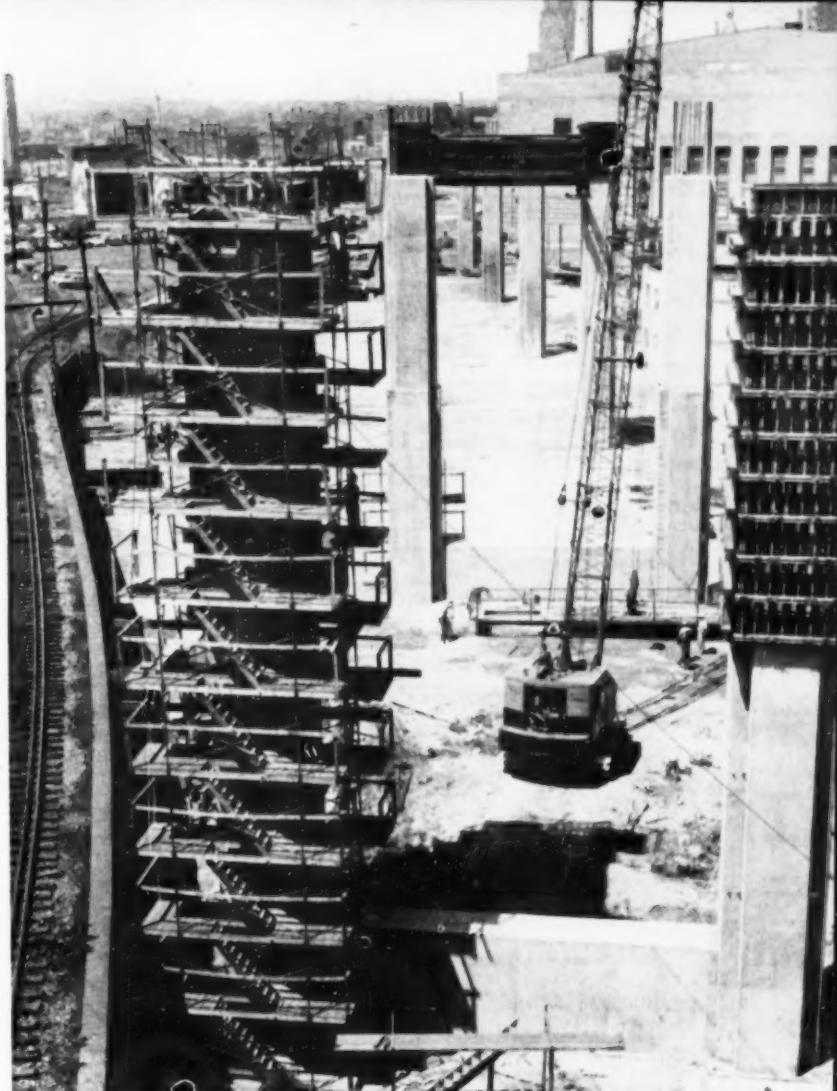
About 15,000 cu. yd. of ready-mixed concrete was required for the piers in addition to that used in the caissons. All concrete was placed through elephant trunks, using a 1-yd. Heltzel drop bucket.

Forms for Tie-Beams

The heavy concrete tie-beams between columns were formed with panels designed to dispense with the forest of scaffolding usually employed to shore such beams. Instead, for easier and speedier erection and dismantling, form assemblies were supported on sets of 25-ton hydraulic jacks at either end, the jacks resting on temporary shelves. The shelves each consisted of a short section of steel H-pile with steel side plate welded on (see sketch), anchored to the face by four 1½-in. Richmond screw anchors set in precast holes.

The considerable dead weight of the forms and fresh concrete was also supported partially by a single jack-supported strut located at midpoint, the load being thus transmitted to the concrete sill below. When it came time to dismantle forms, the jacks were lowered, the bottom form panel shoved laterally into the clear and picked up by the crane, and the side forms then moved.

Equipment used by the contractor, in addition to the Marion 372 noted,

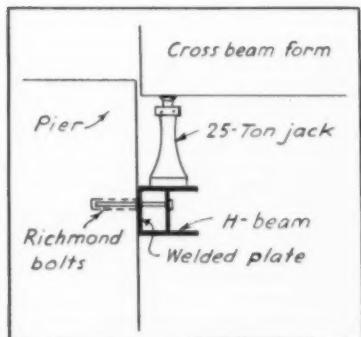


★ Details of the scaffold design are shown—note four pairs of vertical tubes framed together at the corners

included a Marion 362 crane, a Koehring 605 crane with a 95-ft. boom, a Koehring 34 truck crane, and miscellaneous equipment not here enumerated.

John Marks was engineer for Bates & Rogers Construction Corp., Joe Downs was superintendent, and Kenneth Speaks was general foreman.

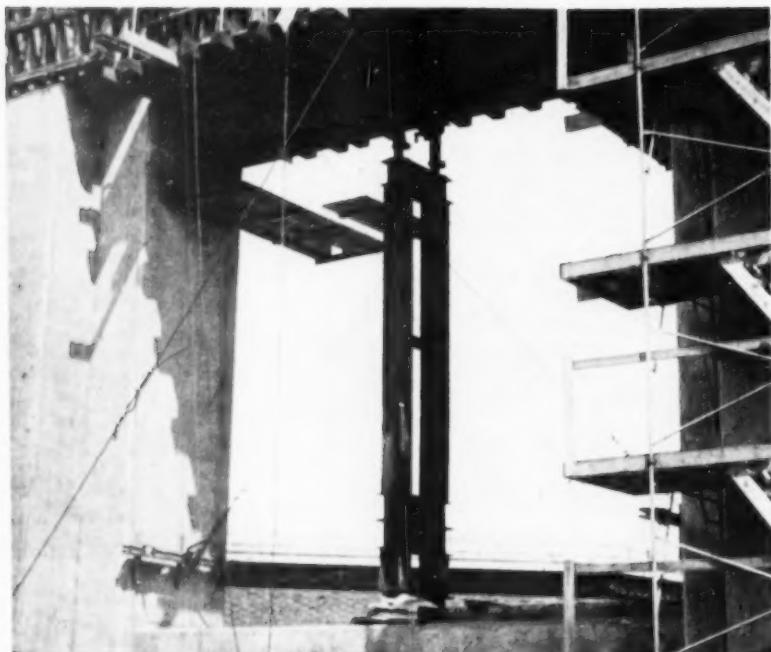
The project is part of the arterial



★ Details of shelf designed as temporary support for cross-beam forms

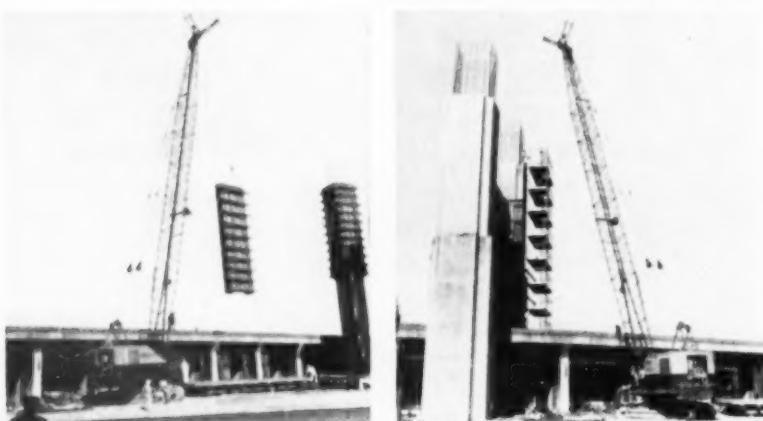
★ Bents were designed with step-backs rather than batter, for good appearance and simplification of forming



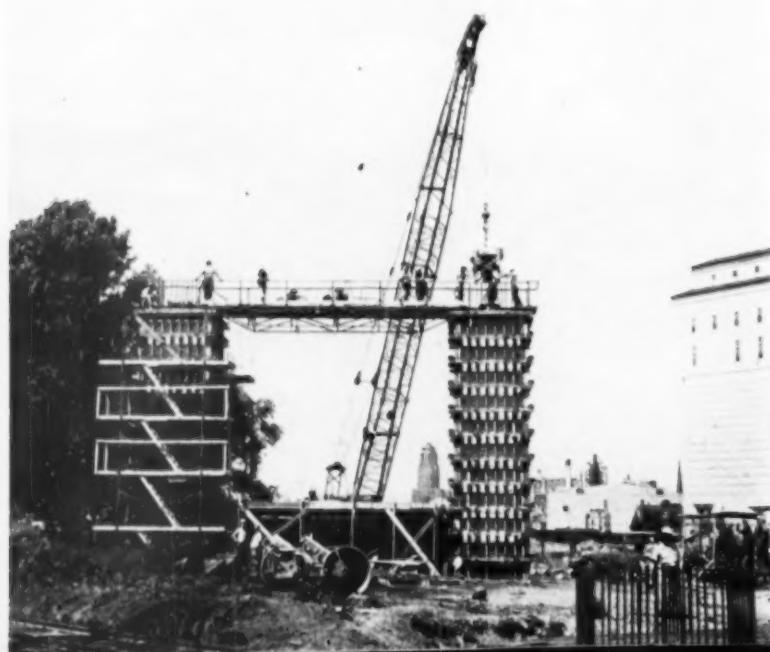


★ Single strut with jacks used to support heavy forms for cross-beam, in lieu of timber shoring

master plan for Buffalo, developed by the New York State Department of Public Works, which is headed by Bertram D. Tallamy, superintendent. Charles R. Waters is district engineer at Buffalo. I. N. Severance was in charge of construction of the piers and foundations for the state. Since completion of the substructure early in 1950 additional contracts have been awarded for work on the north and south approaches, and progress also made on other phases of the urban program. The bridge is scheduled for completion in 1954.



★ Handling form panel and a scaffold assembly from pier to pier



★ A Koehring 605 crane with 95-ft. boom placing concrete. Note construction bridge

Army engineers reduce number of pump models

A recent study at the Engineer Research and Development Laboratories, Ft. Belvoir, Va. may result in reducing the number of general service water pumps in use by the military today from 40 to 5, according the Kenneth L. Treiber, Hydraulic Consultant. Added results will be greater efficiency in the handling of the pumps and a partial solution to the spare parts problem.

The 40 general service water centrifugal pumps currently listed in the Supply Catalog range from single impeller pumps to those with four impellers. Each was bought for a single operating point on its characteristics curve with no provision for the user to utilize the complete operating range of a specific pump.

To determine which pumps would fill all requirements a master curve was plotted encompassing the total range of pumping conditions required by the Army. It was found that five pumps would serve the total range. Emphasis was placed on using pumps that are available, as listed by the Contractor's Pump Bureau, Associated General Contractors of America, Inc. The Contractor's Bureau rating of 7M (7000 gph), 40M and 125M all fit the requirements for three of the five pumps. The rating for the 10M pump was found to be low in head for the requirements established and a pump with a pressure increase of 20 feet was included. The remaining pumping requirement was satisfied by a fifth pump not listed by the Bureau. It is a single impeller, auxiliary self-primer with relatively high head.

The low pressure pumps are used for drainage of ditches, coffer dams and similar applications. The relatively high pressure pump is used for jet service where the sinking of piles for the construction of piers and wharves is the object, or in any instance where a relatively high pressure water service is required.

Robert Moses Wins General Motors Top Award

Seasoned highway leaders among national and regional essay awards, in unique contest aimed at stimulating public thinking on highway problems.

EXPRESSWAY planner Robert Moses of New York City won the top national award in the General Motors Corporation essay competition on "How to plan and finance the roads we need." His 9,000-word statement which drew a \$25,000 cash prize ran counter to many other ideas entered by boldly proposing a sharp increase in federal aid, largely through a raise in the gasoline tax, as the keystone to a ten-year \$5 billion nation-wide road construction program.

The contest which was launched last winter with a national advertising campaign drew 44,000 entries under the lure of \$194,000 in prizes. It is credited with stimulating more thinking by more people on highway problems than any other event in recent years. Beside pointing up the primary need for greatly increased highway building revenues, the competition threw new light on the educational job facing road planners.

The list of winners served as a reminder that seasoned public career men are required to solve the complexities of highway transportation needs and come up with sound answers; highway engineers and other public leaders won a majority of the national and regional awards, and were heavily represented among the state awards. This wasn't a subject for housewives and grocery clerks, although thousands of people of all walks of life submitted ideas.

The Moses Plan

New York's construction coordinator and commissioner of parks divided his proposal in eight main sections: Present Conditions, Standards and Plans, Administrative Jurisdictions, Responsibilities and Interest, Financing, Railroad Grade Elimination, Street and Off-Street Parking, Safety and Other Regulations, and Public Support.

In the financing section Moses estimates that it will be necessary to raise at least five billion dollars a year for road construction over a 10-year period, or twice the present rate. [Although about five billion dollars per year now accrues for roads and streets, about half goes for maintenance and other non-construction requirements. Editor]

To increase the federal government's highway support, the federal gasoline tax would be raised from the present 1½ cents to 3 cents, and all

this revenue plus receipts from the present 6 cents per gallon tax on oil would go toward more than doubling the present federal allotment of highway aid to the states, netting \$1,250,000,000 annually.

The states under the Moses plan would raise their gas taxes an average of half a cent. This would bring state highway tax revenues including other sources up to \$3,450,000,000 of which \$1,400,000,000 would be deducted, capitalized, and used as a credit base for issuance of revenue bonds. The remaining \$2,050,000,000 annually would be spent as it accrues.

Municipalities would increase their urban highway support by \$100,000,000 annually.

All told, these sources would under present or predicted traffic volumes bring in \$7 billions annually, of which \$2 billion would be set aside for administration and maintenance. In his 10-year balance sheet, Moses thus arrives at \$12.5 billion from federal support, \$23.3 state revenue bonds, remaining state revenues \$20.5 billion, public authority bonds \$4.8 billion—or \$50 billion for construction after deducting for maintenance and administration.

Emphasizes Urban Roads

Commissioner Moses agreed with the ideas of many other contestants by urging more money for urban construction. The cities have not been getting their share of road funds to participate properly in a sound highway development, he feels.

The judges in the contest were Ned H. Dearborn, President, National Safety Council; Thomas H. MacDonald, retired Commissioner of Public Roads; Curtis W. McGraw, Chairman, McGraw-Hill Publishing Co.; Dr. Robert Sproul, President, University of California; and B. D. Tallamy, Superintendent of Public Works, New York State, and Chairman of the New York Thruway Authority.

The national regional awards were announced June 18 at a dinner at Detroit attended by highway and publishing leaders. State awards were announced at dinners held in the respective states a few days later. At the Detroit dinner Mr. Tallamy, speaking in behalf of the judges, noted that this essay competition demonstrates that the campaign for better roads has "reached the proportions

of a crusade. . . . Surely the solution to the highway problem is one of the greatest challenges facing our national, state and local governments today." Tallamy paid tribute to General Motor Corporation for focusing widespread national public attention on this critical problem.

At the close of the Detroit award ceremony Harlow H. Curtice, President of General Motors, summed up the problem of, and case for, better highways. While noting that the principal "road block" is financial, the final need is public support. "The winners were unanimous in their belief that necessary action can be stimulated by an intelligent, well informed public," he said. "There is no miracle solution of the highway problem. There is no even *one* solution. But one thing fundamental to all solutions is public support."

General Motors Essay Competition Winners

National

First Prize (\$25,000)—Robert Moses, Construction Coordinator and Superintendent of Parks, New York City.

Second Prize (\$10,000)—Brig. Gen. Lacy V. Murrow, Director of Competitive Transportation, Association of American Railroads, Washington, D. C.

Third Prize (\$5,000)—Claude A. Rothrock, Head, Planning Division, West Virginia State Road Commission, Charleston.

Mention (\$3,000)—William F. Steuber, Jr., Assistant to the State Highway Engineer, Wisconsin State Highway Department, Madison.

Mention (\$3,000)—William E. Wiley, Division of Economics and Statistics, Arizona Highway Department.

Mention (\$3,000)—David C. Guibert, Manager, Inland Automobile Club, Spokane, Washington.

Regional Awards (\$3,000 each)

Austin F. Bement, investment banker and publicist, Detroit, Mich.

Albert Erickson, Highway Commission Member, Helena, Montana.

Bryant Hall, City Planner, City of San Francisco, Calif.

Forest Lowery, Minneapolis Safety Council, Minneapolis, Minn.

Russell E. MacCleery, farmer and representative, National Highway Users Conference, North Chichester, New Hampshire.

Walter L. Pope, Attorney and Legislative Asst. to Senator McClellan of Arkansas.

John J. Ryan, public relations executive, West New York, N. Y.

Lewis W. Waters, factory supervisor, Asheboro, North Carolina.

Ned Williams, Assistant Professor of Economics, University of Mississippi, University, Miss.



Contractors Level Plant Site in Week-End



ONE Saturday late in March a swarm of tractors, scrapers and other earthmoving equipment moved onto a Los Angeles industrial plant site. By Sunday noon 50,000 cubic yards of earth had been moved and the 16-acre site was leveled—in 20 hours instead of a normal 3 or 4 weeks.

The plant is the new one being erected by Minneapolis-Honeywell Regulator Co., at 174th and Gardena St. The performance which was quite an "equipment show" was staged by the Excavating and Grading Contractors' Association of Los Angeles, under an agreement negotiated with the industrial firm to pool a considerable amount of its members' equipment and do the job in short order. Minneapolis-Honeywell got a quick job, and the payment went to the contractors' association as a means of building up its treasury. About \$3,000,000 worth of equipment was used. The equipment time and operators were donated by association members, with the work done in flag-marked strips in friendly competition between the contractors.

★ Scores of earthmoving units ganged up on a factory plant site in Los Angeles, as part of a week-end benefit staged for a contractors' association

(United Press Photos)

Legal

Contract to Remove "Old Paint"

By Albert Woodruff Gray

The Bridge Commission for Cabell County, West Virginia, advertised for bids for cleaning and painting the Ohio River Bridge at Huntington, in that state.

The specifications were, "All surfaces of the metal shall be thoroughly and completely cleaned after all old paint, rust, stain, dirt, grease and other foreign substances have been removed by means of an improved sand blast, pneumatic scaling tools, approved flame cleaning methods, metal brushes, scrapers and other effective means. All surfaces shall be cleaned to the satisfaction of the engineer."

"No larger area shall be cleaned in advance of painting than will permit painting before rusting begins and if clean surfaces rust before painting can be done they shall be re-cleaned by the contractor at his expense so that the first coat of paint may be applied to absolutely rust-free surfaces."

The bridge was of steel construction with a total length between abutments of 2,124 feet and had not been completely repainted during the fifteen years it had been built. The engineers' report recommending this painting estimated the cost at \$75,000.

The lowest of the bids received was \$59,400 and later withdrawn because of a misapprehension that the contract was for the removal of all paint down to the metal, not as this contractor assumed in making his bid, merely the removal of blistered paint.

The second lowest bid of \$69,710 was accepted, the contract signed and the work carried on from June 25th to July 14th, during which time the paint was removed down to the bare metal and the primer coat applied according to specifications.

On that day the paint contractor told the inspector he intended spot cleaning. The inspector protested saying that not only would he not approve of such method but that the contract required the removal of all old paint. Two days later the contractor abandoned the job, writing the Bridge Commission that he had contracted to remove the "old paint which had ceased to be a protective coating."

The contract was readvertised and completed by another contractor at an additional expense of \$52,119.63 in the lawsuit brought to recover this amount for breach of contract the contractor contended that under his agreement the "old paint" he was to

(Continued on page 63)



INTERESTED
IN Saving
\$6,827 per mile
ON ROAD
REBUILDING
COSTS?

Marion County, Indiana, did with an Athey Force-Feed Loader — Portable Breaker team. Actual costs, recorded during the rebuilding of a section of German Church Road, revealed these amazing savings.

The old 3/4" asphalt surface was ripped and new stone added. The Force-Feed Loader picked up the material . . . fed it to the towed Portable Breaker where it was reduced to 3/4" minus. Oil was mixed in and material leveled by a Cat No. 12 Motor Grader. Total cost of the new 2-1/2" surface — including materials, labor, owning and operating costs of all equipment: \$2,173 for a full mile. Cost of methods previously used: \$9,000 for a mile. Savings: \$6,827 per mile!

If you're interested in savings like these, ask your Caterpillar Dealer to prove that the streamlined Athey Method can do the same on your roads. He can do it and there's no obligation. Call on him . . . today!



Send for a free copy of the valuable
Athey Method Book . . . today!

Special
Offer

NAME THE DATE . . .
WE'LL DEMONSTRATE

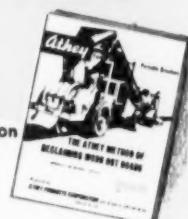


Athey Products Corporation
Dept. RS-7
5631 West 65th Street
Chicago 38, Illinois

Gentlemen:

I would like:

- A copy of the "Athey Method of Reclaiming Worn Roads".
- Cost Records of German Church Road Reclamation.
- To see the color movie of the Portable Breaker working.



NAME _____

ORGANIZATION _____

ADDRESS _____

CITY _____

STATE _____

5631 West 65th Street, Chicago 38, Illinois

Sandy Foundation Area

Compacted by Unusual Method

PILE driving equipment was used to accomplish a rather unusual purpose on a job just completed by Western Foundation Corporation, New York and Chicago, at Blythe, California, for a pipe line compressor building.

The site is underlain by loose fine sands. It was anticipated that compaction of these sands from vibration of the compressors would cause settlement of the new plant. To prevent this, these sands were compacted before erecting the plant by installing sand piles, the vibration and displacement from driving the piles densifying the sand. The piles are 16 in. diam., made of compacted sand, and vary from 20 ft. to 40 ft. in length. A total of 954 piles on a 4 ft. by 5 ft. spacing were driven in the 80 ft. by 208 ft. site.

The limits of the area compacted by pile driving extends beyond the compressor building in order that pile driving for future extensions will not affect the structure.

While sand piles have been used for this purpose in Germany, Belgium, and The Netherlands, it is believed this is the first use of such piles in the United States, according to a spokesman for the contractors.

The pile driving procedure is as follows: Using a No. 0 hammer, a steel

casing of 16 in. diam. with a concrete plug at the bottom was driven into the earth. Inside this casing was a core having a closure plate at the lower end which fits snugly into the 16 in. diam. casing. Casing and core were driven to required depth and resistance, and the casing filled with sand. The core was then placed back on top of the sand and the casing extracted by a system of lines pulling over the top of the core. These lines were reeved in by Western Foundation Corporation's patented system which forces the core down at a rate which compensates for the upward movement of the casing so that as the casing is withdrawn sand is forced out completely filling the volume displaced in driving the casing.

Plans for this method of compaction were developed by Stone & Webster Engineering Corporation. Standard pile driving equipment of Western Foundation Corporation was used to carry out the work. Necessary modifications in pile driving procedures to insure the sand was properly placed were developed by Western.

New Marion Distributor. Tractors, Inc., 128 Narragansett Ave., Providence, R. I. has been appointed distributor for Marion Power Shovel Co., Marion, O. for entire state of Rhode Island and southwestern Massachusetts.

Mapping, subsurface exploration

"Mapping and Subsurface Exploration for Engineering Purposes" is the title of a new bulletin 65 of the Highway Research Board.

The rapid rise in construction costs and increased road damage by greater volume and type of traffic have made highway administrators aware of the importance of soil as a construction material. Many recognize that the soil survey must be made quickly and at a reasonable cost and that this information must be obtained prior to preparation of final plans to be effective in building adequate roads with a minimum expenditure of road funds. Some administrators have undertaken comprehensive soil appraisals on a state-wide basis to obtain a clear understanding of highway-planning needs for future traffic conditions.

The Committee on Surveying and Classifying Soils in Place for Engineering Purposes is cognizant of this situation and has continued its policy of making available lists of geologists and soil scientists who may be able to assist in the engineering interpretation of geologic and agricultural soil maps. Also, the committee has indicated the status of the most-recent mapping by the U. S. Geological Survey and the U. S. Department of Agriculture.

The first paper, by H. E. Barnes, presents a new technique of interpretation for resistivity data to obtain depth profiles, which can be made an invaluable aid for estimating the variations in thickness of layered materials with similar resistivity characteristics.

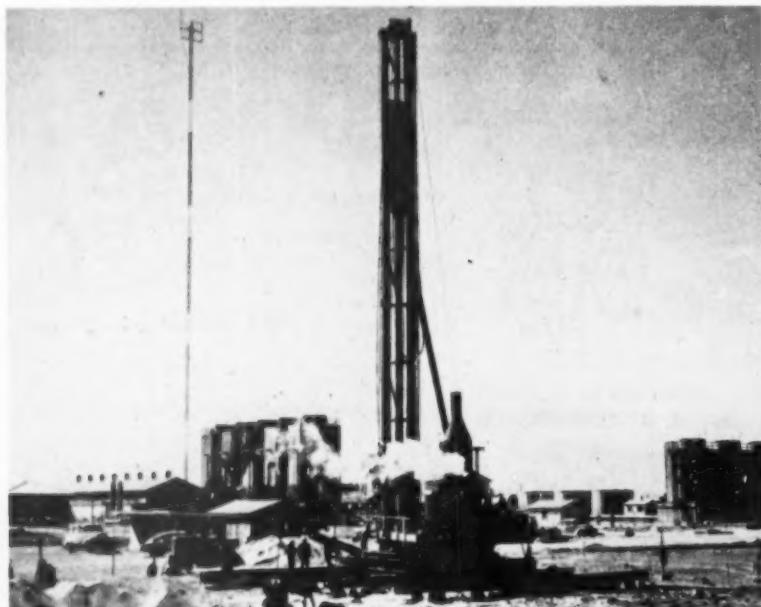
The second paper, by H. E. Marshall, is an excellent review of the Ohio State Highway Department's correlation of geologic and agricultural information with engineering test data to obtain a generalized, engineering-soil map for the state.

Available on request to the Highway Research Board, 2101 Constitution Avenue, Washington 25, D. C.

Jersey court upholds state-backed turnpike bonds

Full legal status for state credit backing of revenue bonds for New Jersey's \$285 million Garden State Parkway, was established when the New Jersey Supreme Court upheld the state's right to guarantee the bonds. New Jersey citizens had overwhelmingly endorsed the proposal last November to issue such bonds, but a citizens group had challenged the constitutionality of the bonds.

The New Jersey Highway Authority, having this OK, is planning to launch construction of the southern sections of the Parkway. Work has heretofore been confined to the sections metropolitan in Bergen County, \$28 million in temporary loans from banking houses having been used to finance contracts awarded to date.



★ Pile rig at work driving casing for the sand piles described

Legal

(Continued from page 61)

remove was only the unservicable paint, not all the paint on the bridge.

In its judgment against the contractor for this amount the Federal Court said,

"There is no custom or usage in the bridge painting trade requiring the words 'old paint' to be construed as unserviceable, damaged or non-adherent painting or giving such words any meaning other than their usual and ordinary meaning. The words 'old paint' must be construed with other provisions of the contract. If one says he is going to trade his old car, for a new one, he uses the word 'old' to distinguish it, not for the purpose of declaring it deteriorated. It is an old car compared to a new one, whether one year old or ten years old."

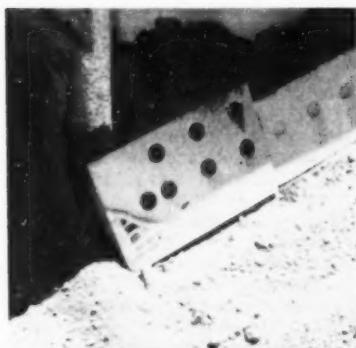
"The words 'old paint' as used in this contract means existing paint. They must be read with the other provisions of the contract. The contract provided for three new coats of paint. Such existing paint as remained on the bridge was described as 'old paint' to distinguish it from the new paint to be applied under the contract."

* * *

Basil B. Wells, Inc. v. County Court,
96 F.S. 677

Hardfacing—you see it everywhere today

The accompanying picture shows what is perhaps too common-place a use of hardfacing to justify publishing. Just a bulldozer blade corner. But some contractors seem to do a more systematic job than others to make these more familiar uses of welding methods to armor their equipment parts against wear. The contractor here was Megarry Bros., St. Cloud, Minnesota, one of the state's largest earthmoving and asphalt paving outfits. The job was a road resurface on U. S. 75, with a large volume aggregate dozed into the traps for the crusher—abrasive stuff "easy" to move but tough on equipment.



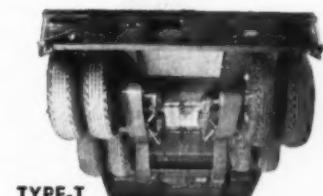
★ Excellent example of armoring blade-corner with hardfacing material to prolong life of bulldozer apron.



NOW AVAILABLE -

with a rear unit to
meet your preference
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Great versatility and exceptional speed of disconnecting, loading and reconnecting have conclusively proved the superiority of



ROGERS
POWER LIFT
DETACHABLE GOOSENECK
TRAILERS



These trailers also embody the exclusive ability to drop the deck to clear low overhead obstructions or raise the deck to pass over humps in the roadway.



Of interest, too, is the fact that you can obtain this remarkable gooseneck in conjunction with any of the popular Rogers rear end units illustrated here.

This enables purchasers to meet special load requirements, to comply with their state road laws or simply satisfy their own preference, many of which have been established through years of satisfactory service with certain types of Rogers Trailers.

Write for all the facts.

Developed by The Trailer Pioneers

ROGERS BROS. CORP. ALBION,
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Divided bed, tilt deck trailer with gooseneck.

Ohio Turnpike Construction Launched

Quarter-billion-dollar letting schedule set to start June 30 for the 241-mile project, following court decision clearing legality of pavement selection based on Commission's engineering judgment.

WITH the Ohio Supreme Court decision June 3, ruling that alternate pavement bids for asphalt and concrete were not necessary, the Ohio Turnpike Commission immediately got set for a whirlwind catch-up job of awarding the project sections to contract.

First to be advertised June 30 under the schedule were sections C-2 and C-3 totaling 10.3 miles of turnpike line on the "expedited section" on the east end where tie-in with the Pennsylvania Turnpike is acutely needed. Also set for that date was section C-16 in Summit County near the Cuyahoga River. Lettings will follow thereafter at 16 weekly intervals, with the expectation of placing all roadway contracts by late September. The contracts which will approach \$250 million in combined value, include 13 which were previously let but cancelled.

During April and May the Commission was importuned to award grading, drainage and structures separately, or at least grading and drainage, in order to permit some progress despite a long delay in the court decision. T. J. Kauer, chief engineer, however firmly held to his recommendation that the "package" principle be used in awarding the complete roadway section including paving. This method he pointed out would permit substantial economies through better integration of all phases of work under one contract management.

Bridges for four major river crossings have already been awarded, and steel ordered, since their legality was not at stake. The largest bridge, over the Cuyahoga, is well advanced under Horvitz Co., contractors. Most of the remaining structures, comprising 30 stream crossings, 298 highway grade separations, 36 railroad grade separations, and 251 major drainage structures, are to be included in the package contracts.

About 60 roadway and bridge contracts in all will involve 25,800,000 cu. yd. of earth excavation, 2,600,000 cu. yd. of rock, 41,900,000 cu. yd. of borrow, 509,000 cu. yd. of structure concrete, and 6,840,000 sq. yd. of concrete pavement.

Court Decision Significant

The decision of the state Supreme Court, which was 7-0 unanimous and sweeping in its wording, is of nation-

wide interest to highway and street officials. It spelled out the right of public officials and bodies to use their judgment in the selection of materials with which to build public highways. The decision upset a ruling of an Appeals Court which followed a suit brought by an asphalt paving contractor challenging the legality of selecting concrete paving without taking alternate bids on other pavement types.

In the words of an article in the *Cleveland Press*, June 4, the decision cleared chief engineer Kauer of "charges and innuendos" of bad faith and collusion. Mr. Kauer, who had once served as chief engineer of the Reinforcing Wire Institute in addition to more recently being Ohio Director of Highways, was alleged to have a bias favoring concrete. The pavement design adopted, consisting of 10 inches of concrete on a special subgrade, however was the result of an exhaustive analysis and recommendations by the Commission's general consultants, J. E. Greiner Company. The report was based on a study of all cost and service factors, including safety, maintenance, and anticipated service life under predicted traffic and climatic conditions. The appellate court ruling in effect would have forced a selection of pavement type on a basis of first cost for designs of estimated comparable load carrying capacity, over which there remains much controversy.

The Supreme Court decision said that the Turnpike Commission had wide discretionary power in materials selection, subject only to the limitation that it act in good faith and not abuse its position. Because the principle of professional decision based on engineering analysis was at stake, the Ohio Professional Engineers' Society, and also other bodies had publicly supported the stand of the Commission.

During the weeks of uncertainty before the ruling, the Ohio Department of Highways marked time with lettings, feeling that the decision would affect the legality of any paving work awarded in Ohio with public funds. The City of Columbus, likewise, held up street paving work for this reason, as did other Ohio cities.

Contractor organizations meanwhile stayed on the sidelines, except to urge an early decision. A considerable number of highly organized and

equipped contractors in both the asphalt and concrete fields are available in Ohio to assure spirited home-state competition. As it is, a large volume of asphalt work will be involved in shoulders and other phases of the turnpike program. The first paving is now scheduled for early 1954.

Electronic Batching

The decision clearing the way for concrete paving throws the spotlight on the Commission's concrete specifications, which include several noteworthy features. Chief innovation is the requirement that all concrete, for both paving and structures, must be batched with automatically controlled equipment. Designed to insure uniformity and simplify inspection, these specifications have already been put to the test on the Horvitz Co. bridge contract.

Heretofore only the California Division of Highways, among the state highway departments, has made widespread use of automatic batching control. It has been required on California state highway paving for the last five years, and has the enthusiastic endorsement not only of the engineers, but also of the contractors. The latter, who balked at first on the investment required, found that the controls simplified the task of meeting specifications and of operating their plants generally.

As of May 9 according to an official of the Ohio Turnpike Commission, four batching equipment manufacturers had reported to be ready to quote on and deliver the equipment specified. These are Blaw-Knox Division of Blaw-Knox Company, Pittsburgh, Pa.; Butler Bin Company, Waukesha, Wis.; the Heltzel Steel Form and Iron Co., Warren, Ohio; and the C. S. Johnson Company, Champaign, Illinois. In addition, the Scientific Concrete Service Corporation, Elizabeth, New Jersey, had reported that it was ready to equip new or existing concrete batching plants with the necessary equipment to bring them within specification demands.

Specifically, Section CE-10 of the amended general specifications states that "the weighing equipment for cement and aggregates shall include an automatic recorder or recorders, capable of being locked and of recording the weight of each ingredient de-

livered to each batch. It shall also include means of identifying each batch so that a record of moisture compensation made in weighing aggregates can be accurately recorded." Automatic cut-off of cement delivery at exact weight is required.

The degree of quality control wanted by the commission is further shown by their clause pertaining to moisture compensation in batch materials. Equipment must permit, within 2 minutes, the determination of free water in aggregate samples to $\frac{1}{4}$ of 1 per cent accuracy. Batching scales are required to be equipped for adjusting weight of water to compensate for aggregate moisture with similar accuracy.

Electronic push-button equipment will figure in the batch equipment used on the Ohio Turnpike. Under this impetus the Ohio and other state highway departments are considering similar controls.

AGC protests new federal contract form

The Associated General Contractors of America, Inc., has entered a protest against the provisions of the revised federal construction contract form which has been ordered into use on federal construction contracts June 19, 1953.

On May 26, H. E. Foreman, Managing Director of the A.G.C. wrote Edmund F. Mansure, Administrator of the General Services Administration, charging that the new form is substantially the same as the 1942 version it will replace. Mr. Foreman cited cases in which the contractor was denied compensation for damages as the result of delay by actions of the government and others where appeal from the decision of the department head was denied the contractor unless fraud on the part of the department head was alleged and proved. Under the new contract form the contractor is still denied the right of appeal from decisions of the heads of federal contract awarding agencies.

It was noted in the letter that the A.G.C., together with representatives of the American Institute of Architects, American Society of Civil Engineers and the American Society of Mechanical Engineers, were named as a subcommittee of the construction Industry Advisory Council and submitted to the then Federal Works Agency a tentative revision for criticism, recommendations and suggestions. The solicited criticism and recommendations of four of the largest and most respected organizations in the construction industry were almost completely disregarded, which prompted Mr. Foreman to inquire "If representatives of the largest segments of the industry cannot in any important degree alter the terms of Government contracts, even when invited to do so, how can an indi-

Some States Take Alternate Bids, Some Don't

Results of recent Roads and Streets questionnaire on state highway department policy; 42 states reporting

| | |
|---|-----------|
| No limitation placed on engineer's decision on paving type . . . | 37 states |
| Alternate designs are usually (or sometimes) estimated as part of the design procedure . . . | 20 states |
| Bids usually (or sometimes) taken on alternate types, but not required by law or court ruling . . . | 8 states |
| Alternate designs are required . . . | 1 state |

Comments received with answers to questionnaire

"No limitation—subject to administrative review of the commission."—E. L. Roettiger, State Highway Engineer, Wisconsin.

"Alternate bids are occasionally taken comparing asphalt concrete and portland cement concrete."—H. K. Griffith, Commissioner, West Virginia.

"Alternate types are set up for intermediate type surfaces only."—L. N. Ress, Chief Highway Engineer, Nebraska.

"Alternate bids taken where designs are considered comparable and competitive."—R. A. Harris, Chief Engineer, Miss.

"Alternate designs required where it is evident that the costs are comparable. In many areas we have excellent base materials at the roadside, in which case alternate designs involving imported materials are considered a waste of time. We secure ample competition in this work."—D. C. Greer, State Highway Engineer, Texas.

"In my opinion it should be an engineering decision."—R. H. Baldock, State Highway Engineer, Oregon.

"We consider various designs and take alternate bids frequently as a matter of economy and to provide more competition in bidding."—E. J. James, Chief Engineer, Louisiana.

"We feel the pavement choice should be based on an economic evaluation by the engineers and not by salesmen. Our practice, even though we use bituminous materials exclusively, is to evaluate

ate most thoroughly the various types of bituminous pavement for each job. The availability of suitable materials near the job is a key factor. Money spent on hauling doesn't build an inch of pavement, so this factor has to be scrutinized carefully."—F. D. Merrill, Commissioner, New Hampshire.

"In Cook County, similar designs are part of the construction of expressways. In this work the technical design committee of the agencies involved have adopted a policy of alternate flexible and rigid type designs for main line pavements."—F. N. Barker, Chief Highway Engineer, Illinois.

"I believe the department should ascertain what it wants and ask for bids on that. I do not believe in alternate bids."—G. Albert Hill, State Highway Commissioner, Connecticut.

"Ninety-five per cent of roads are flexible type. Rigid pavements are specified only where, in the engineer's judgment, water and soil conditions warrant rigid pavements, which are then specified without alternate bids."—E. G. Johnson, Chief Engineer, Utah.

"In general the type of pavement selected is the result of our experience, based on load requirements, climatic conditions, cost of initial construction and satisfactory performance."—John McCloskey, Executive Assistant, Massachusetts.

"Economic study prepared for each major project."—W. F. Childs, Chief Engineer, Maryland.

vidual contractor or bidder have any prospect of influencing the terms of Government construction work whereon he has pledged his equipment and capital as security that the contract will be carried out in accordance with its terms?"

In commenting on this matter a bulletin of the Contractors Association of Western Pennsylvania, said: "It is hoped that the unjustice

of the document will be recognized prior to the effective date and corrective measures taken." Mr. Foreman's letter was also sent to Mr. Charles E. Wilson, Secretary of Defense.

• A 6-mile section of Pittsburgh's Penn-Lincoln Parkway, multi-million-dollar East-West expressway on U. S. 22 and 30, was dedicated June 5.



★ More systematic use of standard signs will be welcomed by contractor and road users alike in Missouri

Missouri Engineers and Contractors

Cooperate on New

Job Flagging and Signing System

A STANDARDIZED system of signing, flags and flagging, to warn motor vehicle operators of work under way on Missouri highways, soon will be put into effect throughout the state. Standardization of such warning devices and procedures is a cooperative project of the State Highway Commission and members of the Associated General Contractors of Missouri.

The uniform signing program has a dual purpose. One goal is to provide more adequate warnings to motor vehicle operators at points adjacent to highway work, and thus seek maximum safety for both the vehicle operator and workmen. The other goal is to promote "better housekeeping" at improvement projects, and eliminate delapidated warning devices that have been so prominent.

Specific Signs Planned

The first sign to greet the motorist on an improvement project under the standardized plan will read: "Missouri Moves Forward. This Highway Improvement Is For Your Future Safety and Convenience." This sign, to be erected by Commission forces, will be used so that motorists will know what projects are a part of the state's 10-year highway modernization.

The next sign, to be placed at the point of entrance to an area in which the highway is being improved, will read: "Please Drive Carefully Next (Number of) Miles." On that same sign will be a description of the work being done, such as shoulderering, grading, etc., and the name of the contractor, if it is a contracted project, or the State Highway Commission, if work is being done by Commission forces.

As the motorist moves into the improvement operation, he will see the sign "Road Construction, Slow," or "Road Repairs, Slow." Then will come a sign identifying exactly what work is being done, such as "Fresh Oil," "New Grading," "Open Trench," or perhaps the warning "Loose Gravel," "Equipment Working."

Two final signs then will send the motorist on his way under normal driving operations. The first will advise him "End of Improvement. Thank You For Your Patience," and will carry the name of either the contractor or the Commission. Finally, there will be the sign "Resume Speed, Thank You."

Intermediate signs will be moved as work progresses, and will be removed as the hazard cause ceases to exist. Portable barricades will be used when work is being done on the

pavement proper. Flagmen will be used at all times when the pavement is wholly or partially blocked by crews working on the roadway, or when equipment is crossing the roadway.

To Be Reflectorized

Signs will be night reflectorized for safety. Also, most of the signs will carry one or two 12 by 12 in. red warning flags, while all equipment will carry 24 by 30 in. red flags mounted 8 to 12½ ft. above the roadway when it is in use on existing highways. Lighted torches will be maintained in front of all signs and barricades if hazards remain at night.

Plans for the standardizing project were mapped by a joint Commission and AGC committee, headed by Richard E. Quinn, Kansas City contractor. Committee members included two other contractors, Ray Gast and Grant West, and three Commission officials, Dean Wilson, engineer of maintenance, Leon Corder, traffic engineer, and G. M. Threlkeld, Director of the Department of Information.

Initial test of the new signing plan is being given in Nodaway county, on a Route 4 project contracted to Quinn. The improvement begins about three miles east of Maryville and extends east toward Ravenwood. However, the new signs will be put into use throughout the state at the earliest possible date.



★ Two more of the new Missouri standard signs, designed for maximum readability and long-range attention

International Road Federation Reports Steady Expansion

The International Road Federation with three coordinated offices in Washington, London and Paris, reported a year of rapid growth at its annual Board Meeting held in Washington May 12, 1953. This far-flung organization, whose objective is to promote highway development throughout the world, was launched only five years ago. It fosters the formation of good roads associations in various countries. Beginning with six such associations, it reports that this number has increased to 45 national road promotion groups. In each case these groups are supported by business and industrial leaders and other citizens to work with the public and with governing officials.

The three headquarters offices, while each autonomous, works as part of a coordinated unit. Each is supported by business firms interested in road advancement. Representatives of the London, Paris and Washington offices meet several times a year.

In addressing the recent board meeting, president F. T. Magennis, Goodyear Tire & Rubber Co., noted that IRF is primarily a service organization. It furnishes data on highway benefits, counsels on the setting up of sound local road promoting groups within the various countries and recommends engineering advisers qualified to help work toward proper planning and administration of road improvement programs.

A feature of its work also is the support of several fellowships which enable young graduate engineers to secure further education and practical training in American universities. This popular feature has produced a number of able young engineers; the petitions from applicants have grown so numerous that additional fellowships are expected to be established. Eight IRF fellows are presently in the U.S.

In outlining Western Hemisphere and Pacific Island activities of IRF, president Magennis reported that road associations have been established in 17 countries, where work on highway programs is proceeding vigorously and rapidly. Japan and the Philippines are among these countries. Mexico has a very strong and effective group, and is encouraging the formation of state or local sub-associations.

Peru, as another example, has an active road group, with two branches and 200 local citizen committees also formed, and an ambitious national

(Continued on page 71)



Engineer answers vital questions about the strongest wire rope made—Flattened Strand

Why does Hercules® Flattened Strand wire rope continue to outperform round strand rope by 2 to 1 or more? Can you use it? Here, Walter C. Richards, chief engineer, A. Leschen & Sons Rope Co., tells you.

More and more wire rope users are continually experiencing or hearing about spectacular performances of Hercules Flattened Strand wire rope. The explanation is clear.

First, Hercules Flattened Strand is a Super-rope because it packs 10% more steel than any round strand rope of the same size. It's 10% stronger...10% safer.

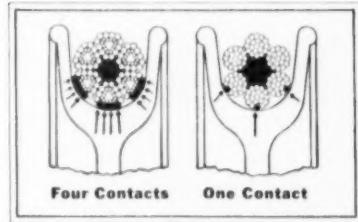
Second, Hercules Flattened Strand wears longer and more evenly. That's because there are four wires per strand contacting sheave grooves instead of one.

Third, Hercules Flattened Strand resists crushing and internal strand-cutting, because strands rest snugly against each other, keystone fashion, with less internal pressure or friction.

Fourth, Hercules Flattened Strand prolongs its own life and the life of equipment, because the relatively smooth surface of the rope prevents corrugating and wear on sheave grooves.

Can you use it?

It's a known, proved fact that no other wire rope made can equal Flattened Strand on applications such as hot ladle cranes, skip hoists, and dredge ropes. It is also best on a variety of other equipment both large and small. For many uses, it is truly a Super-rope.



With Flattened Strand, notice how four wires per strand contact sheave grooves—reducing rope and equipment wear.

But, the question is, can you use it to advantage? That can be answered only by a qualified wire rope engineer who is thoroughly acquainted with the characteristics and proper uses of Flattened Strand rope.

Check with the authority

That means, check with Leschen. It's wise to do so because Leschen pioneered and perfected Flattened Strand wire rope. Leschen developed special machines to make it. Leschen conducts continuing research on correct uses. Leschen is the authority.

If you discover you can use this Super-rope—Hercules Flattened Strand—you'll soon begin saving time, labor and money. Why not investigate now?

**Hercules Flattened Strand wire rope made by
A. LESCHEN & SONS ROPE COMPANY
St. Louis 12, Missouri**

In business only to make wire rope . . . better wire rope . . . since 1851
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Off-Center Laning

Adds More Street Capacity in Los Angeles

This city has 24 miles of streets under off-center lane control. Here are figures on the traffic capacity added, and an analysis of the factors involved.

By James Joseph

R. T. DORSEY, for thirty years Los Angeles' Traffic Engineer, is busy as usual planning how he could "build" new thoroughfares without spending a construction dollar. Dorsey has been doing just that ever since 1928, when he first concocted the idea of off-center laning on 8th Street in Los Angeles.

Meanwhile, crews were busy on Olympic Boulevard, a typical off-center laned street in Los Angeles.

A two-man team, working a $\frac{3}{4}$ -ton pick-up, moved along at about 20 mph. One man, either strapped to a bucket seat rigged to the truck's left-rear fender or grasping a vertical support, placed rubber cones every 100-150 ft. Frequently the truck stopped while the driver got out to roll an intersection's "No Left Turn" or similar sign into the new lane. Both the set-out and pick-up of cones and signs progressed at an average 15-17 mph., with two crews working the 8 off-centered miles of Olympic Boulevard.

Each work vehicle carries about 300 cones. In almost all cases, coming crews move toward the heavy traffic flow. That is, they start at the end of the off-center stretch and progress toward its beginning. This progression is naturally reversed at the morning in-bound and evening out-bound peaks.

Gains 4.1 mph.

Traffic counts show what off-centering has meant to Olympic Boulevard: in off-center sections speeds average 22.5 mph., even at peaks, while in areas where no control exists, average speed is only 18.4 mph. That extra 4 miles an hour can move a great number of cars at rush-time. Yet, even with one lane borrowed from the light traffic side, average speed there increased to 19.1 mph.

(with off-centering and no parking in effect) as against 18.4 mph. previously.

Off-centering alone, however, could not have effected this smoother, more coordinated traffic flow. At least four additional control factors contributed: (1) parking prohibited during peaks from the off-centered street; (2) use of cable-connected, 3-dial timer signal systems; (3) off-centering of some secondary streets leading to Olympic Boulevard intersections; (4) left turns prohibited at all points where such movements resulted in unusual delays.

Today Los Angeles has something like 24 miles of streets which use off-center laning during peaks. Each application has in effect created—without construction—a roadway of much larger traffic handling capacity. Some years ago when Wilshire Boulevard was off-centered at its most congested downtown sections, traffic engineers estimated that off-centering created capacity equivalent to a \$27,000,000 boulevard project.

Chicago, for example, has estimated that its hydraulically-operated road separators on the Outer Drive increased traffic handling equal to construction of a \$25,000,000 highway. Yet, the hydraulic mechanism is expensive and inflexible, while Los Angeles, with a total crew of 24, equipped with a few lightweight trucks and cones, gets the same job done without initial investment.



★ A small crew handles a large mileage of lane shifting

Not Always Feasible

In Los Angeles, the off-center lane is employed on major thoroughfares where use of permanent one-way traffic is not practical, nor temporary one-way traffic feasible.

Some streets, however, do not lend themselves to off-centering. It is not possible to operate an off-center lane movement where street cars are operating; where streets are already divided by a median strip or where the terminal point of a main artery is a "T" intersection. This last is particularly true where traffic discharging at the "T" cannot be absorbed along the route by various control turn-offs.

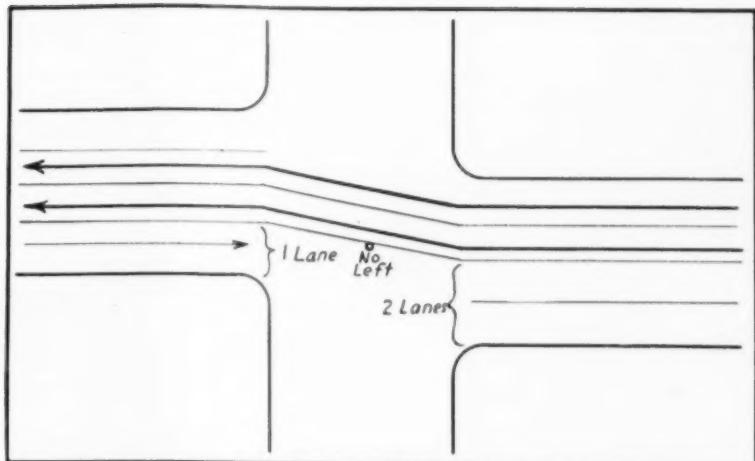
In setting up an off-center section, a prime factor is kept in mind: that congestion results from a constriction of traffic at intersections. Intersection delays are transmitted all along the grid pattern. This means that off-centering must be combined with 3-dial timers, cable connected signals; with "No Left Turn" signs and with parking prohibitions during peaks. At the same time, a combination of controls are instigated on secondary streets leading into main thoroughfare intersections.

When off-centering is considered for a Los Angeles street, lane count crews are dispatched to various intersections, usually four men to an intersection. Four men can tabulate traffic flow in four to six lanes in each direction. This is a cordon count. At a typical intersection in Los Angeles, a traffic count showed that three lanes of a 6-lane street handled 1800 cars an hour during peaks. In the direction of minimum flow, north, the remaining three lanes handled but 1200 cars an hour. From this survey it became obvious that in the direction of maximum peak flow, each lane was handling 600 cars (a total of 1800 per hour), while in the opposite direction, each lane was handling but 400.

Added Peak Capacity

Thus, Los Angeles Traffic Department reasoning went like this: if southbound lanes can handle 600 cars, why not also the north? So, off-center laning was instigated. Off-centering converted the street during peaks to a four laner in the major direction of flow, and to two lanes in the minor. In less than six months the peak flow in the four lanes increased to 2400 per hour—exactly as the department had figured. Thus, each lane was now handling 600 cars—a boost in the direction of greatest peak travel. Meanwhile, traffic in the two lanes (direction of minimum flow) remained the same, 1200 cars. Thus, those two lanes were now handling 600 per hour.

Within six months after inception of off-center laning, the street's capacity during peaks rose from 3,000 to 3,600 cars, an over-all 20% increase in roadway capacity and 33½% increase in the capacity in the direction of greatest demand.



★How off-center laning is handled through a jog intersection

To build permanent roads with like capacity would have cost millions. Yet, a couple of crews, laying down centering cones four times a day, were able to create new road capacity, and in effect, new roads.

Lead-in Streets

Off-centering is also used in Los Angeles for some secondary lead-in streets to main thoroughfare intersections. This makes sense since the reason for off-centering (and for coordination of 3-dial timer signals and parking prohibitions) is to give maximum speed and capacity in the direction of peak hour flow. Very often delay time at a signaled intersection can be decreased by putting traffic from the secondary side street through the intersection in shorter time. Off-center laning will do the trick. For example, at one intersection where the signal cycle was 60 seconds, delay time was reduced to 30 seconds by off-centering a secondary street from a standard 2-2 to a 3-1. By easing "signal delays" at various intersections along the favored maximum flow route, the whole system flows smoother and faster.

Off-centering has also been used successfully to straighten jogs at intersections. Off-centering, favoring the maximum direction of flow from one side of the intersection to the other, eliminates the sharpness of the jog. Thus, a 2-2 lane street on one side of the jogged intersection becomes a 3-1 on the other.

Off-centering, of course, is reversible, favoring the direction of maximum flow in the morning peak and the outbound maximum flow in the evening and reverting to normal center laning during non-peak hours.

Traffic Engineer Dorsey says, "Where a strong trend in one direction exists during one part of the day, with the reverse trend in another part of the day, a system of 3-dial timers may frequently be used. These

can give perfect progression to one direction in the morning and the opposite direction in the evening, the third period being one in which opposing delays are balanced to the greatest possible degree. For perfect control, cable connection is required to all signals in the system."

Cuts Accidents

Interestingly, in 1949, a year in which LA expanded its off-center laning more than in any year since its 1928 inception, there were 30% fewer traffic fatalities than in the year previous. Traffic engineers like to think—and probably they're correct—that this reduction was due in large part to off-center laning which resulted in more orderly traffic movement during peaks. When Olympic boulevard was widened, its lanes were planned with off-centering in mind.

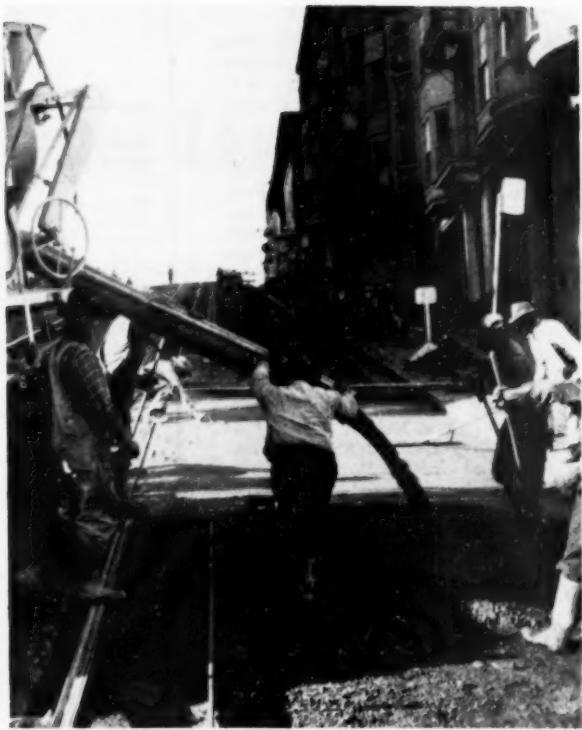
It happened this way: just before the contracts were let for widening, the traffic department found that a total width of 56 ft. was contemplated for no apparent reason. Traffic engineers immediately suggested that the width be established at 60 ft. so as to provide six 10-ft. lanes, with prohibition of parking, rather than four 10-ft. lanes, with two partial lanes for parking, as a 56-ft. wide roadway would have provided. One reason why a 60-ft. roadway was suggested was that off-center movement could be employed to maximum.

So plans were changed, the road widened to 60 ft. and off-center laning has been used ever since, 4 lanes in the direction of greatest flow, two in the opposite.

There is no problem in Los Angeles initiating off-center movement on a new street. The public is accustomed to adjusting and are quick to take advantage of the added roadway space. Off-centering is popular with the public and the physical presence of off-center crews is visual evidence that the city's Traffic Department is doing everything possible to expedite traffic flow.



★ A section of Powell Street being repaved to improve traction; the Municipal Railway cooperated for the car track zone



★ A stiff high-early strength mix (using calcium chloride) is used on hills such as Powell Street

Steep San Francisco Street Repaved

Powell Street, running up famed Nob Hill in San Francisco, was resurfaced recently, in this city's continuing program of making its steep streets safer. While the grade on this street is only 17 per cent, and hence commonplace in a city sprinkled with 20 to 30 per cent grades, the importance of this particular street serves to focus on the problem and methods.

The Powell Street project con-

sisted of ripping out old brick which had worn to a dangerous smoothness and repaving with portland cement concrete. Eaton & Smith, paving contractors, performed the work. The new pavement consists of a 6-in. slab, increasing in the outer 2 ft. to 8 in. at the edge, with transverse expansion joints every 60 ft. and dummy joints every 20 ft. Repaving was done a block at a time, and one side at a time, specifications permitting placement in a width up to 14 ft. maximum. Five-sack concrete of 2 in. slump was used, with 10 lb. per cu.

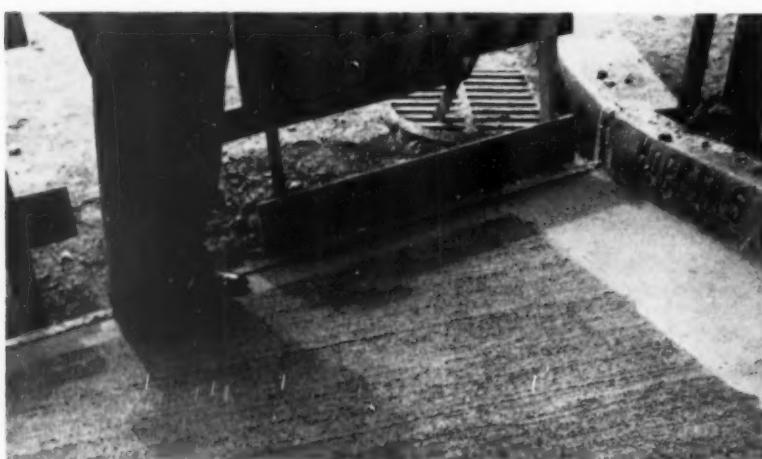
yd. of calcium chloride added for accelerated hardening. Concrete was delivered ready-mixed, struck off by hand, and finished with light wood floats followed by brooming.

Because of the important role of the broomed finish in providing a good tire grip, the brooming was done under explicit directions. A large, stiff-bristled push broom of the type used by street sweepers was specified. This broom was refitted with a handle extending in the direction of the bristles, as with an ordinary house broom, thus converting it from a pushing to a dragging type tool.

Special care had to be taken to keep from spilling concrete in the slots of the street car cableways. And the drivers had to maneuver their mixer trucks carefully due to the steepness of the grade. The placement of concrete on steep grades otherwise has involved no special problems to San Francisco contractors, who, however, at times in the past have had to do such things as couple their mixer trucks to a motor grader to keep them from sliding downhill.

The city's largest taxicab fleet, heretofore ordered off Powell Street in wet weather, has now given this street its blessing.

The city department of public works, which directs street paving work, uses asphaltic pavement on most of the streets, with, however, a policy of going to concrete where grades are steeper than 14 per cent.



★ Essential part of the repaving technique is the securing of a broomed surface, using a modified street boom

International Federation

(Continued from page 67)

roadbuilding program advancing. An association has been formed in the Argentine.

Up and down the Central and South American countries, the Pan-American Highway is no longer called just that, he observed, but this great interconnecting route is now called the Pan-American System, taking in connector and branch roads in the respective countries.

IRF London Reports

Activities of the London office were outlined by Sir Donald Gainer, Chairman, his division encompasses Britain, Africa, except the northern countries, the Near East, India, Pakistan, New Zealand and Australia.

Today a Central African Road Federation is shaping up, representing associations formed in Southern and Northern Rhodesia and Nyasaland. An East African Federation is planned ultimately as a coordinating agency covering Tanganyika and Uganda where road groups are to be established.

India and Pakistan have well established groups and national road programs. Egypt has a particularly strong and active road association and a considerable road program. A small beginning has been made in Iraq, and New Zealand citizens have formed a preliminary committee.

The greatest progress under IRF-London has occurred in Australia, notes Sir Donald Gainer. This country is on the threshold of new and far-reaching highway development.

Coming back to Africa, this speaker told of the immensity of the continent and the basic strategy of IRF which is to foster the creation of an African interregional road network. The local road federation in each country is working to secure road links that connect as part of either north-south or east-west transcontinental routes. The continent's development potential is vast, and through highway transportation is a key to opening up great areas.

IRF Paris Report

Mr. Georges Gallienne, Chairman of the Paris office of International Federation, also reported rapid development. His office covers the countries of Europe and North Africa.

The most important achievement in Europe in his opinion is the growing strength of the idea of a European Highway Network, interconnecting various countries. The top officials in transport from eight countries recently met to discuss the problem, and another meeting soon is expected to have 11 nations represented. These officials contemplate a permanent association, purpose of which is to agree on engineering standards and to pro-

(Continued on page 77)

Want to re-route equipment?

A black and white photograph showing a man in a hard hat and safety vest standing next to a large piece of heavy machinery, possibly a bulldozer, with "DAVIS CONST'D" written on it. Another man is shown in a smaller inset photo, wearing a cap and glasses, speaking into a microphone connected to a radio receiver.

**Do It FAST
with RCA 2-Way Radio!**

—SAYS AL DAVIS
OF DAVIS CONSTRUCTION CORP.

"In a matter of seconds I can call any job—switch any piece of equipment—from headquarters or my car," says Mr. Davis. "That means real savings."

"With RCA 2-Way Radio we save thousands of dollars every year eliminating unnecessary travel. We dispatch equipment directly from job to job, re-schedule it in emergencies, call it in—without the expense of idle time."

"On the basis of our hourly costs, RCA 2-Way Radio paid for itself in less than a year by saving at least an hour a day. In an emergency it paid for itself by helping save a trailer during a windstorm. Per-

sonally, I wrote it off the first time I picked up the microphone and talked to my superintendent forty miles away."

Do It BEST with RCA 2-Way Radio

Here's why heavy-equipment operators all over the country are specifying RCA 2-Way Radio to cut costs and save time:

EASY TO USE as your telephone • COMPACT . . . takes no more space than a spare tire • TOUGH . . . built to take rough field conditions • RELIABLE . . . engineered by the leaders in electronics • PRACTICAL . . . service available from RCA Service Company.

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Radio Corporation of America
Communications Division
Dept. 202S, Building 15-1, Camden, N. J.

- Please send me information on RCA 2-Way Radio
 Please have a representative call on me

Name _____ Title _____

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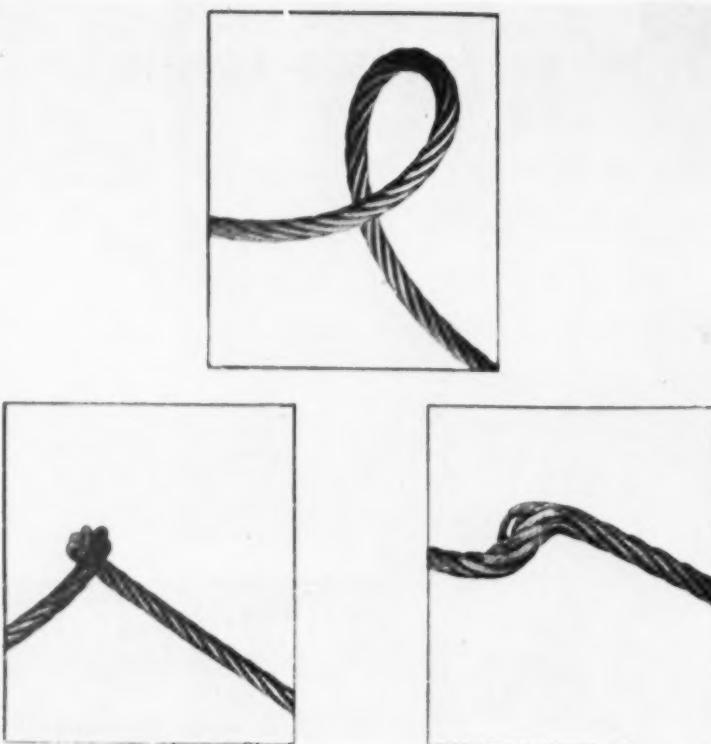
Address _____

City _____ Zone _____ State _____



RADIO CORPORATION of AMERICA
COMMUNICATIONS EQUIPMENT

CAMDEN, N. J.



★ A kink starts when the rope starts looping like this. And the damage is done when the looping tightens as shown. Even if the wires are not badly damaged, the rope is out of shape, which means excess wear on the displaced strands. If the loop is thrown out at the start, kinks can be avoided.

Correct Care and Handling of Wire Rope

By Walter C. Richards

Chief Engineer
A. Leschen & Sons Rope Company

The correct handling of a wire rope before use is very essential if best results in its use are to be obtained. Wire rope is often referred to as a machine and should be handled accordingly.

Wire rope arrives on the job either in a coil, or wound on a reel. It will no doubt reach its destination in a railroad car or truck. When unloading do not drop the reel onto the ground or platform. The heavy rope might shift its position or from its inertia alone cause the reel to collapse. This might damage the rope, or it could be damaged in the difficult operation of removal from a collapsed reel. If in a coil the rope might be bent enough to give it a permanent set. Do not roll reels or coils over very stony ground. The weight may cause sharp rocks to indent the rope. A bar used to roll a reel will do the

same thing if it bears against the rope. Instead use the bar against the flange.

Storing. Reels and coils are generally stored for a period before installation. They should be placed under cover if possible or at least kept clean and dry and protected from the weather. Do not keep rope in a place that can be reached by acid fumes or other corrosive agents. If the rope is to remain in storage for some time, it is advisable to cover it with waterproof paper. As received it is frequently factory covered with a "protector" which will preserve it for a long time. Otherwise, the outer layer should be covered with a good rope lubricant.

If used rope is put into storage, the same precautions should be taken to protect it from corrosion. In addition it should be thoroughly cleaned and given a coating of lubricant. It should be wound on a reel and coiled loosely on the ground or floor. Do not pile heavy pieces of equipment on top of the rope.

- An anti-diversion amendment to the state constitution has been voted in Wyoming, subject to ratification by voters next November. If it is approved, Wyoming will become the 25th state to enact such legislation.

PAR group aims for adequate road program in every state by 1955

The National "Project Adequate Roads" or PAR Committee met in Washington June 15 to review its first year and plan for the future. An objective was adopted of securing an adequate highway program in every state by 1955. This committee, of which Arthur C. Butler of the National Highway Users Conference is Secretary, elected Clem D. Johnson as national chairman in a meeting attended by 150 representatives of industry, business, civic, highway-user and farm organizations.

Chairman Johnston called for "clear programs that every citizen can understand—complete and fair to every group. . . Let's try to get them by 1955, so that when the time rolls around for authorizations and appropriations, we will be able to look a good way down the road and see clearly the distance we have to cover."

Mr. Johnston has the background of a long career in public service organizations. The PAR direction was previously under a temporary operating committee consisting of Arthur M. Hill, chairman of executive committee, Greyhound Corporation and president of the National Association of Motor Bus Operators; and Albert Bradley, executive vice-president of General Motors Corporation and chairman of the National Highway Users Conference.

Better Public Understanding

Better public understanding of our highway requirements, and the people's insistence that the job be done, will speed the building of the adequate roads our country needs, noted Albert Bradley in the opening address. Mr. Bradley emphasized that, despite the progress that has been made, more and more average American citizens must be encouraged to speak out for sound highway improvements.

Roadside advertising signs okayed for Ohio Turnpike

Advertising signs are likely to be permitted within 1000 feet of Ohio's new Turnpike if legislation is passed as predicted. The Ohio House of Representatives has killed a bill prohibiting signs on private property abutting the Turnpike.

The New York Thruway Authority, the Pennsylvania Turnpike Commission and other such agencies heretofore have prohibited signs on the theory that it spoils the roadside appearance and creates a driving hazard.

- Ernest L. Merrill, Principal Highway Engineer, Maine State Highway Commission, has retired after 37 years of service with the department.

Special Drainage Along Ohio Turnpike to Protect Farm Tiling

By Henry N. Luebcke

Drainage Engineer, J. E. Greiner Company,
Consulting Engineers to the Ohio Turnpike
Commission

THESE supplemental design criteria pertain to the alterations and reconstructions of existing agricultural drainage systems affected by the construction of the Ohio Turnpike; to the considerations which must be given in the designs of Turnpike drainage structures and ditches when agricultural drainage is an influencing factor; and to the provisions which must be made for future agricultural drainage and for improvements to existing systems.

Tile Drainage Fields

Lateral Drain Tiles—Existing lateral drain tiles crossed by the Turnpike shall be intercepted approximately 25 feet outside the Turnpike right of way line by collector mains and properly outletted. Lateral tile farm drains shall not be outletted into the parallel Turnpike side ditches. Existing ditches or existing collector mains not affected by the Turnpike construction and Turnpike ditches shall be used for outletting such collector mains. Collector mains shall cross the Turnpike where necessary to find an outlet.

Collector Mains—Existing tile collector mains crossed by the Turnpike shall be outletted into the Turnpike side ditches, shall be carried parallel to the Turnpike at locations outside the Turnpike right of way to suitable outlets, or shall be carried under the Turnpike in reconstructed conduits and be reconnected to the existing collector mains or be carried to suitable new outlets. Wherever possible, without constructing undue lengths of collector mains or ditches, tile collector mains shall be outletted at points outside the Turnpike right of way.

In general, water from one existing collector main is not to be diverted to another existing collector main. Where diversion of tile water is unavoidable, the collector main receiving the diverted water shall be of adequate capacity to carry all water delivered to it, or it shall be reconstructed with pipes of such adequate capacity.

Surface water from the Turnpike shall not be discharged into existing agricultural tile mains.

Future Collector Mains—Collector mains shall be installed crossing under the Turnpike to provide for future agricultural tile drainage in areas where potential agricultural drainage is evident, and where no other outlets are available. The necessity for such provisions for future agricultural drainage shall be determined by surveys of the adjacent lands and by analysis of the soil conditions. The advice and recommendations of the county agents should be obtained at each location where provisions for future drainage may be considered.

The following data will serve as a guide in determining the requirements for future agricultural drainage:

- (a) The master soil profile of the Turnpike.
- (b) The reconnaissance soil survey of the Turnpike prepared by J. E. Greiner Company.
- (c) County soil maps prepared by the Division of Soil Survey, U. S. Department of Agriculture, and the Ohio Agricultural Experiment Station. Minor correlation problems

arising from revisions of nomenclature shown on older maps can be reconciled by reference to the county soil reports. To supplement county soil maps, and to furnish data in counties not covered by the county maps, soil maps on air photo base for some individual farms are on file at the U.S.D.A. Soil Conservation Service offices at county seats.

(d) Highway Research Board Bulletin No. 22 "Engineering Use of Agricultural Soil Maps" and Bulletin No. 2—"Soil Exploration and Mapping."

(e) Known practices on similar soils along the route of the Turnpike.

(f) Figure A—"Soil Identity and Drainage Characteristics" and Figure B—"Ohio Soils" give pertinent information which may serve as a guide.

Depths of Collector Mains—Collector mains shall in all cases be installed at sufficient depths to permit the connection of all lateral drains which are intercepted. The minimum depth of the invert of such collector mains shall be 3.5 feet below field level to insure the collection of tiles of unknown depth. As a provision for future lowering of the drainage

Why Special Drainage Criteria Needed

Most of the soils along the Ohio Turnpike require artificial drainage. The only drainage for the "Old Black Swamp" which covered the western one-half of the route, consists of a network of drain tile and shallow surface drains outletting into excavated open ditches. These open ditches are continually being cleaned and deepened, and the land-owners are installing additional tile drains at greater depths. Construction of the Turnpike divides this network of drains into two parts, and the invert of Turnpike culverts and tile crossing under the Turnpike are control points in future drainage improvements.

The Ohio Turnpike Commission and the J. E. Greiner Company, Consulting Engineer to the Commission, recognizing the importance of drainage to the health and agriculture of the area, developed these criteria in consultation with the land-owners, county engineers, the U. S. Soil Conservation Service and the Ohio State University. These criteria provide a standard of design for the reconstruction of the existing tile drainage systems, and assure the land-owners and the adjoining communities dependent on agriculture that control points established by the construction of the Turnpike, will not be the limiting factor in future drainage improvements.

systems, collector mains shall be installed at depths of from 4 to 5 feet below average field level where outlets are available. Where existing outlets will not permit the installation of collector mains at depths which will provide for future requirements, the collectors shall be installed at depths which will permit their connection to existing outlets.

Collector mains for agricultural drainage, which are installed under the Turnpike or under reconstructed local roads, shall have invert depths below average field levels adjacent to the upstream right of way line as follows:

| Prevailing Field Slope | Minimum Invert Depth |
|------------------------|----------------------|
| 0 to 0.25% | 5.0 ft. |
| 0.25% to 0.50% | 4.8 ft. |
| 0.50% to 1.00% | 4.5 ft. |
| Over 1.00% | 4.0 ft. |

Where rock is encountered these depths may be reduced, provided that all existing tile drains are outletted.

Where it is impossible to install collector mains at the minimum

depths specified above without the construction of extensive outlet pipes or ditches, provision for future lowering of the drainage fields shall be made by either one of the following methods:

1. Provide a pipe of a larger size than that required, with the top of the pipe at the elevation of the top of the existing collector main at the downstream side of the Turnpike or reconstructed local road and with the invert of the pipe at the required minimum depth.

2. Install an additional pipe of adequate size at the required minimum depth and seal both ends.

5. *Grades*—The minimum grade for tile collector mains and tile outlet mains shall be 0.05 percent, with a desirable grade of not less than 0.10 percent.

The desirable maximum grade for agricultural tile drains is 1.0%. The maximum velocities for tile mains with open joints at design rates of flow shall be as follows:

Maximum Velocity, Feet per Sec.

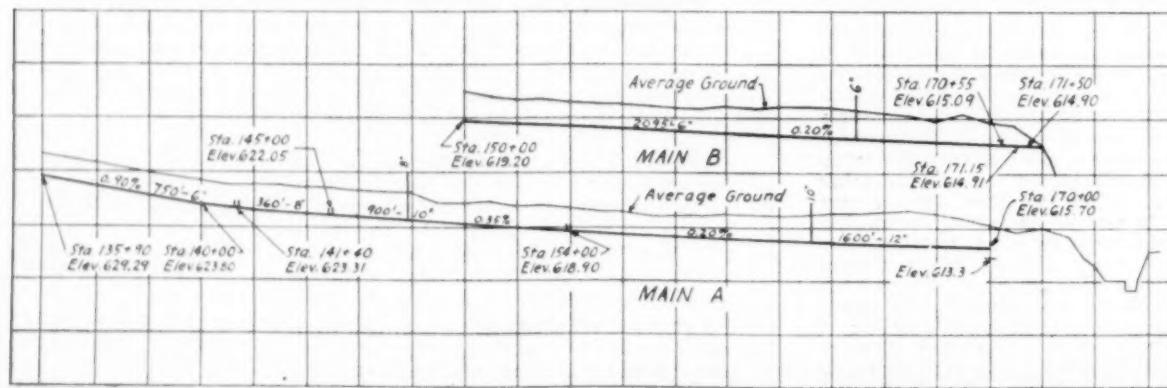
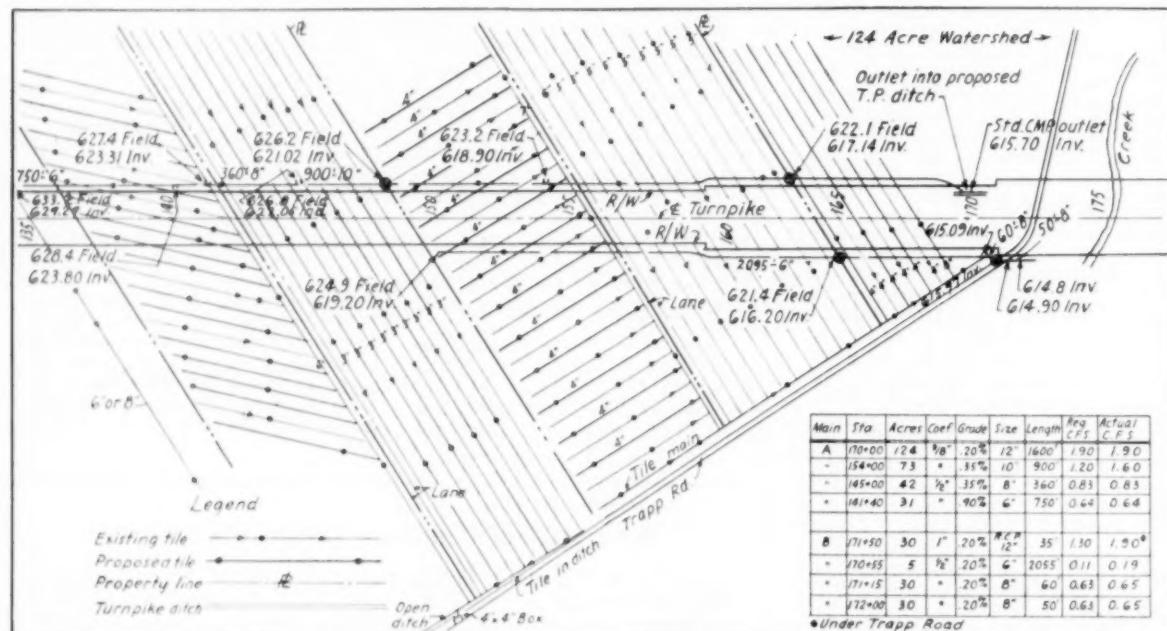
| Type of Soil | Agricultural Drain Tile | Bell & Spigot Pipe | Unsealed Joints |
|--------------|-------------------------|--------------------|-----------------|
| Sand | 4 | 5 | |
| Sandy Loam | 5 | 6 | |
| Silty Clay | 6 | 7 | |
| Clay Loam | 6 | 7 | |
| Clay | 6 | 8 | |

Capacity—Tile mains, collecting mains and outlet mains shall be designed for the drainage coefficients, R , as here tabulated, where R is the amount of water in inches that will be removed from the drainage area by the tile in 24 hours.

The required pipe sizes may be taken from Figure C. For collector mains under the Turnpike, a minimum value of R of 1 inch, and a minimum size of pipe of 12 inches, shall be used.

Drainage Ditches

Agricultural Drainage—Drainage ditches constructed primarily for



★ Figure 1—One of several schemes of drainage interception required through farm tile systems

agricultural drainage, and whose capacities are not influenced by Turnpike drainage or whose capacities will not affect the adequacy of Turnpike drainage structures, shall be designed to carry the rates of discharge given in Figure D without overflowing of the ditch banks. When such ditches serve as outlets for tile drainage fields, the bottoms of the ditches shall be not less than 1 foot below the minimum elevations, at their outlets, of laterals and collector mains discharging into the ditch. However, when a reconstructed collector main is outletted into an existing ditch the distance from the bottom of the ditch to the invert of the main at its outlet need not be more than that prevailing on the original collector.

Surface Drainage—Drainage ditches constructed primarily for surface drainage, such as Turnpike ditches, entrance and outlet ditches at culverts, and stream channels shall be designed in accordance with the Design Criteria of the Engineering Report.

Ditch Depths—As a provision for future lowering of or extensions to agricultural drainage systems, ditches in regions of artificially drained land, or where such drainage is a future possibility, shall be constructed to the minimum depths specified below, except where no outlets are available for ditches of these depths, or where rock is encountered, these depths shall be reduced provided that all existing tile mains and ditches are outletted:

(a) For ditches outletting collector mains the minimum depth below average field level shall be 5 feet.

(b) Outlet ditches for Turnpike drainage structures carrying surface water only shall be constructed with the bottoms of the ditches at least 4 feet below the average field level at the right of way line on the upstream side of the R/w. of the Turnpike or reconstructed local road.

(c) Outlet ditches for Turnpike drainage structures which also serve agricultural drainage systems shall



★ Example of poorly designed road culvert, with invert too high to permit development of ditches and tiles needed by farmers. Ohio turnpike engineers have taken steps to develop

Inches of Water, R, to be removed in 24 hours

| Soil Mineral Muck | Areas with Surface Drainage* | | Areas with no Surface Drainage** | |
|-------------------------|------------------------------|-----------------------------|----------------------------------|----|
| | For 8" or smaller tile 1/2" | For 10" or larger tile 3/4" | 1" | 2" |
| | 1" | 1" | | |

* The area requiring tile drainage is here considered the drainage area. Surface water must be removed by natural surface drainage or field ditches.

** The entire contributing water shed of the area having no surface drainage is here considered the drainage area.

be constructed with the bottoms of the ditches not less than the following depths below average field level near the upstream side of the R/w.

| Prevailing Slope | Ditch Depth |
|------------------|-------------|
| 0.00% to 0.25% | 6.0 ft. |
| 0.25% to 0.75% | 5.5 ft. |
| 0.75% to 1.50% | 5.0 ft. |

Ditch Design—Ditches designed primarily for agricultural drainage systems shall be designed for the estimated discharge by the Kutter or

Manning formula, using a value of "N" of 0.035.

The minimum bottom widths of ditches to serve agricultural drainage systems shall be as follows:

| Side Slopes | Bottom Width |
|------------------|--------------|
| Flatter than 4:1 | 2 ft. |
| 3:1 to 4:1 | 3 ft. |
| Seeper than 3:1 | 4 ft. |

Side slopes flatter than 2:1 shall
(Text continued on p. 79.
See p. 76 for table.)

Figure A—Soil Identity and Drainage Characteristics, Ohio Turnpike

| POSITION— usual | Residual S. E. Ohio | Terrace or upland glacial | Upland or terrace or bottom | | | | Upland glacial | Upland or terrace or bottom | | |
|-----------------------|------------------------|------------------------------|-----------------------------|--------|----------|------------------|-------------------|--------------------------------|--------|-------|
| | | | mod. slope | slight | rise | flat | | Depressed | 0% | 0% |
| SLOPE—usual | Hilly 50-20% | sloping-flat 25-0% | 15-4% | 4-2% | 2-1% | 1-0% | 0-1% | 0-1% | 0% | 0% |
| PROFILE NO. | 6 | 5 | 4° | 3 | 2 | 1 | 7 | 8 | 9 | 0 |
| Color of plowlayer | Yellow to brown | brown | brown | tan | mottled | ash | medium | dark | darker | black |
| Natural drainage | droughty | excessive | ideal | slow | sluggish | very sluggish | slow | water impounded | | |

*Profile may require drainage outlet for springs and seepage.

The following soils require artificial drainage, and outlets for existing or future drainage systems should be provided.

- 1) All soils whose profile numbers are 1, 2, 3, 7, 8, 9 and 0
- 2) All soils whose profile number is 4 if the adjoining fields have seepy areas

H. H. Morse has correlated Ohio Soils by a series number as shown in Figure B; this will be helpful in identifying soils. It is the key to soil maps of individual farms made by the Soil Conservation Service.

The more common soils along the Turnpike are boxed in this Figure. Series 6086, Brookston silty clay loam, serves as an illustration of the series numbers as follows:

60—Shown in the horizontal lines, indicates soil origin: i.e., late Wisconsin heavy calcareous till

8—Shown in vertical columns, is the profile number indicating its internal drainage

6—Indicating its texture (silty clay loam)

OHIO SOILS

| Soil characteristic | Shallow | Porous | Deep | Gray-brown | Brown-gray | Gray | Dark gray | V Dark-gray | Gray-black | Organic | Exception |
|-------------------------------|---------|--------------|---------------|----------------|---------------|--------------|------------|-------------|------------------------------|---------|----------------------|
| Under drainage | Well | Well | Well | Moderate | Imperfect | Poor | V Poor | V Poor | V Poor | V Poor | |
| Profile number | 6 | 5 | 4 | 3 | 2 | 1 | 7 | 8 | 9 | 0 | |
| FIRST BOTTOMS ASSOCIATED WITH | | | | | | | | | | | |
| Glacial limestone | 10 | Gennessee | Eel | Shoals | () | Wayland | Killbuck | Sloan | Wabash | Kerston | 118 Algiers |
| Glacial sandstone & shale | 12 | Chagrin | Lobdell | () | () | () | () | Popokating | () | () | 204 Ross |
| Residual " light/dark | 13 | | | | | | | | | | Walkill |
| Residual sandstone & shale | 14 | Pope | Phila | Stendal | Atkins | | | Elkins | | | 200 Carlisle |
| Residual limestone | 15 | Huntington | Linside | Newark | Melvin | | | Dunning | | | Silty muck |
| Red clay shale | 16 | Moshannon | () | Seneca | ville | | | | | | |
| TERRACES ASSOCIATED WITH | | | | | | | | | | | |
| E. Wisc calc silt & clay | 22 | | () | () | () | () | () | () | () | | 213 Wyatt |
| Wisc calc till, partly sorted | 24 | Mill Creek | | () | () | () | () | () | () | | 235 Monclova |
| Ill calc till silt & clay | 26 | Williamsburg | () | | | | | | | | |
| L. Wisc calc gravel & sand | 27 | Rodman | Fox | Fox (deep) | Bronson | Homer | | Westland | Abington | | |
| L. Wisc calc silt & clay | 28 | | | | Markland | McGory | Zipp | Montgomery | Kings | | 285 Shandon |
| Wisc sand & gravel, neutral | 29 | | | | Nineveh | | | | | | |
| Wisc sand & gravel, prairie | 30 | | | | Warsaw | | | | | | Edwards |
| E. Wisc calc sand & gravel | 31 | | | | Rush | | | | | | |
| Wisc acid sand & gravel | 32 | Otisville | Chenango | Chenango | | Braceville | | Atherton | | | |
| Wisc acid silt and clay | 33 | | | | Mentor | Glenford | Fitchville | Sebring | Luray | | |
| Ill acidic sand & gravel | 34 | Hocking | | Hocking | () | () | | | | | |
| Ill calc sand & gravel | 35 | | | | Dunkinsville | () | () | | | | |
| Ohio River sand & gravel | 36 | Wheeling | | Scioto | Sciota | Weinbach | Gnat | Chilo | | | |
| Red clay shale | 37 | | | | Vincent | | | | | | |
| Residual limestone | 38 | | | | Elk | Captina | Taft | | | | |
| Residual sandstone & shale | 39 | Holston | | Holston | Monongahela | Tyler | Purdy | Blago | | | 393s Zoor |
| RESIDUAL UPLAND | | | | | | | | | | | |
| Sandstone & shale | 40 | Muskingum | | Wellston | Tilsit | Johnsburg | Mullins | No | Texture | | 414 Zanesville |
| Reddish shale | 42 | Rarden | | Coolville | | | | 0 | Sand | | 434 Elfort |
| Yellow, acid clay shale | 44 | () | | | Keene | | | 1 | Loamy sand | | 432 Zaleski |
| Limestone, S E Ohio | 45 | Brooke | | Brooke | | | | 2 | Loamy fine sand | | |
| Olive, calc shale | 46 | | | | Guernsey | | | 3 | Sandy loam | | |
| Red clay shale | 47 | Upshur | | Upshur | | | | 4 | Fine or very fine sandy loam | | |
| Complex ls, ss & sh | 48 | Westmoreland | | | | | | 5 | Loam | | |
| Complex red sh & ss & sh | 49 | Meigs | | Meigs | | | | None | Silt loam | | |
| Complex - Meigs & ls | 50 | Belmont | | | | | | 6 | Silty clay loam | | |
| Limestone & calc shale | 51 | Fairmount | | Maddox | Ellisberry | | | 7 | Clay loam | | Eden |
| Limestone - high Ca | 53 | Caydon | | Hagerstown | Bedford | Bentonville | | 8 | Silty clay | | 526 Heitt |
| Calc gray shale | 54 | Owney | | Owney | | | | 9 | Clay | | 566 Frankstown |
| Dolomite, porous | 55 | Cedarville | | Cedarville | | | | G | Gravelly | | 578 Burgin |
| Dolomite, dense | 57 | Brutton | | Brutton | Bedford | Jacksonville | | S | Stony | | 583 Fawcett |
| Black bituminous shale | 59 | Calyer | | Byington | | | | | | | Noeville, Latham |
| GLACIATED UPLANDS | | | | | | | | | | | |
| L. Wisc mod heavy calc | 60 | Hennepin | Kendallville | Miami | Celina | Crosby | Bethel | Pandora | Brookston | Clyde | Carlisle Conover |
| L. Wisc heavy calc | 60 | | | Miami | Celina | Crosby | Bethel | | | | 6046 heavy ill ph |
| L. Wisc high lime gravel | 61 | Rodman | Bellefontaine | | (St. Clair) | (Nappanee) | | | | | Waaka |
| L. Wisc heavy shaly till | 62 | | | | St. Clair | Nappanee | Palmer | | | | (to be correlated) |
| Lake plain calc v. heavy till | 63 | | | | | | | | | | |
| L. Wisc shallow over ls | 64 | Milton | | Milton | Randolph | Randolph | | | Millsdale | | 684 Wynn |
| L. Wisc light tex leached | 65 | | | | (Spore) | (Galion) | | | | | Field names |
| L. Wisc till on block shale | 66 | | (Lyndon) | (Lyndon) | | | | | | | Field names |
| E. Wisc calc till | 67 | Hennepin | | Russel | Xenia | Fincastle | Delmar | Cope | Brookston | | |
| L. Wisc low lime till | 69 | Olena | Alexandria | Cordington | Bennington | Condif | | | Morenco | | |
| L. Wisc v. heavy shaly till | 70 | | | | Ellsworth | Mahoning | Trumbull | | Chippewa | | |
| L. Wisc light acid till | 71 | | Wooster | Confield | Ravenna | Trumbull | | | Chippewa | | 725 Masshen |
| L. Wisc heavy acid till | 73 | | Wayne | Rittman | Wadsworth | Trumbull | | | Chippewa | | 726 Ottsville |
| L. Wisc shallow on ss & sh | 74 | Lordstown | | Lordstown | Hornell | Allis | Wickliffe | | Huron | | |
| Ill heavy calc till | 75 | Edenton | | Cincinnati | Rossomoyne | Avonburg | Clermont | Blanchester | Blanchester | | 774 Parks |
| Ill v. heavy calc till | 76 | Jessup | Loudon | | Bennington | Condif | | | | | 775 Banta |
| Ill calc till on ls | 78 | | (Belfast) | (Allenville) | | | | | | | Field names |
| Ill ss & sh till | 79 | Negley | Hanover | | | | | | | | 814 Fallsburg |
| Ill shallow on ss & sh | 80 | Millwood | | Millwood | | | | | | | |
| Ill till on gray shale | 82 | | | | () | () | | | | | |
| Ill till on black shale | 83 | | | (Jennings) | | | | | | | Not correlated |
| L. Wisc deep acid sand | 84 | (Bridgman) | (Coloma) | (Metea) | (Aubee) | | | | | | Not correlated |
| L. Wisc deep neutral sand | 85 | () | () | () | () | | | | | | Not correlated |
| LACUSTRINE | | | | | | | | | | | |
| Calc gravelly beach ridge | 90 | Bellmore | | Vaughnsville | | | | | | | |
| Calc silt, clay & f sand | 91 | | Lucas | Lucas | Fulton | | | Toledo | Bono | | |
| Neutral to st acid sands | 92 | (Calumet) | | (Enos) | (Weiss) | | | (Granby) | Maumee | | Not correlated |
| Deep acid sands | 93 | Plainfield | | Berrien | Morocco | | | Newton | (Dillon) | | 949 Warners |
| Sand over calc clay | 95 | | (Ottawa) | Berrien | Rimer | | | Wauseon | Neapolis | | |
| Sand over acid clay | 96 | | | | | | | Reynolds | | | |
| Lowline silt clay & f sand | 97 | Nunda | | Painesville | Canaeada | Conadice | | Lorion | Monroeville | | |
| Delta on silt & clay | 98 | | | Ruggles | Bogart | Wilmer | | Olmsted | | | |
| Kildeer clay | 99 | | | | | () | () | () | () | | Like Paudling |

Compiled by H. H. Morse, Soil Conservation Service - January, 1949

Revised - 3-L-14081

(See p. 79 for continuation of text.)

International Federation

(Continued from page 71)

mote improvement of the arteries defined in the 1950 Geneva conference. The IRF has been asked to supply data on international financing in this connection.

Twelve national road federations now exist in Europe, said Mr. Gallienne, and groups are in process of formation in Portugal and Turkey, leaving only Greece and Denmark without such beginnings. Road federations are active in Morocco, Algeria and Tunisia and expect to work toward an integrated road network.

At the Washington meeting the IRF delegates reelected to the Board of Directors the six members whose terms expired this year. These are B. C. Budd, Packard Motor Co.; B. A. Dutton, Standard Oil Co. (New Jersey); Wm. B. Greene, Barber-Greene Co.; Chauncy B. Smythe, Thew Shovel Co.; C. B. Thomas, Chrysler Export Corporation and A. J. Weiland, Ford International. Robert O. Swain, Executive Director continues as head of the Washington staff.

County officials plan National Meeting Sept. 24-25

A national highway conference of county officials under the sponsorship of the County and Local Roads Division of the American Road Builders' Association is announced for September 24-25 in Wisconsin. Sessions will be held in the Dell View Hotel on Lake Delton in the beautiful Wisconsin Dells resort region. Preliminary details are being worked out in cooperation with the Wisconsin County Boards Association.

According to tentative program plans, the two-day session will present three panels—one on construction, one on maintenance and a third on county road administration, management and state-county relations. "In addition to outstanding experts as members of the several panels, we expect to have two or three speakers of national renown in their particular line," declared Ben F. Ostergren, managing director of the County and Local Roads Division, ARBA.

"Our purpose in making this announcement so far in advance is to enable county officials and all others interested in county roads to arrange their schedules so they can be present," Mr. Ostergren continued. "Competent representatives of contractors, manufacturers and materials and supplies groups will attend to give expert advice on application of equipment, materials, etc. It is our intention to present the county highway picture as it affects all levels of government and all forms of construction and administration. The emphasis will be on county and local roads."

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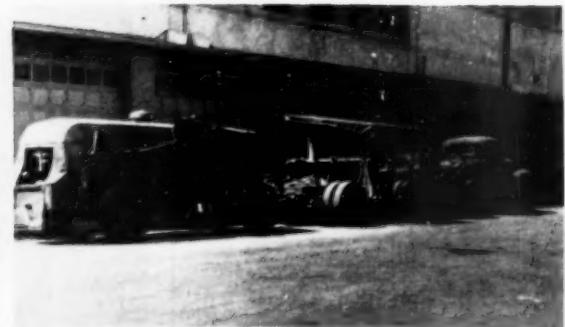
★ Trailer-mounted battery of rock drills, used to cut row of holes along a "break line" in the pavement to be removed

Special equipment does quick, neat job of car rail removal

A combination of special equipment has been used successfully by Chas. L. Harney Co. of San Francisco, to simplify removal of abandoned street car track rails in connection with repaving.

As pictured here, a line of holes is first drilled along either side of the rail, to facilitate a neat break-out of the concrete in the track zone. The holes are drilled by a battery of five Gardner-Denver rock drills, mounted in a row on a special trailer frame. The rig is towed by a truck which advances between each drilling operation, resulting in a continuous line of evenly spaced holes creating a line of weakness in the slab. A Gardner-Denver 500-cfm. compressor trails along to furnish air.

The deck of the trailer is fitted with a seat for the operator, necessary valve controls, spare drills, tools, and sun canopy. ROADS AND STREETS presents this machine as one of several variants of a kind of rig that is finding increasing favor among street contractors. (ROADS AND STREETS, June, 1948, pp. 84-86; January, 1953, p. 73.)



The second step in rail removal then follows. Shown working on Folsom Street in San Francisco is a Hyster logging arch pulling up the rails. The unit is equipped with a stirrup-shaped grapple which is fastened to the rail. A winch line up over the logging

boom exerts sufficient pull to yank up even the most tightly embedded rail.

The combination of pre-drilling and steady pull-up minimizes shattering of adjacent pavement, and saves time and labor all around.

How an Accident Can Cost More Than You Think

A dirt-loaded Euclid truck was moving south on a 6 per cent downgrade haul road from borrow pit. Rounding a gradual curve, the driver took the wrong side of the road and crashed head-on into an empty Euclid truck traveling north on the correct side of the road.

The tractor of the empty Euclid was knocked off the road and down a steep embankment. The front end of the attached trailer also moved off the road. DIRECT COST OF ACCIDENT—Injuries to the two drivers—\$850.00.

Contractor's Additional Cost—Including clearing the road, moving damaged equipment to repair shop, 2 hours' delay in production, repairs of equip-

ment 8 days' delay in getting the damaged equipment back on production, hiring and training one new driver and 10 days before the other driver could return to work—\$6,500.

MORAL—Driver training was the minimum. The control of drivers while operating was not in effect. The firing of the first Euclid driver in this case was perhaps justified. The reinstatement of drivers and daily short meetings before each shift were inaugurated. "Keep Right" signs and reflectors were installed.

AN OUNCE OF PREVENTION IS WORTH A POUND OF CURE.

—Constructors Association of Western Pennsylvania



★ The Hyster logging arch, removing rail on Folsom Street, in San Francisco

Robert H. Pearson Retires. Robert H. Pearson, associated with Gardner-Denver Co., Quincy, Ill., for 37 years, has retired as vice president and will move to Denver, Colo., to assume management of Air Rentals, Inc., a newly formed organization which will distribute Gardner-Denver equipment and several allied lines of equipment and supplies for construction and mining. Mr. Pearson was elected vice president in 1934 and served as sales manager for construction and oil field equipment up to the time of his retirement.

Personnel Changes in Texas Asphalt Dept. T. R. Ellis has been appointed assistant manager of the Asphalt Sales Department of The Texas Co., with headquarters in New York. He replaces J. B. Stewart, who has retired under the company's retirement plan. Ellis was formerly manager of the New York Division of the Asphalt Sales Department, and was succeeded in that position by H. J. White, who was promoted from representative at Jacksonville, Fla. J. A. Morrow, formerly salesman in North and South Carolina, replaces White as representative at Jacksonville.

(Continued from page 76)

not be used if the velocity in the ditch at design flow is less than 2.5 feet per second.

Maximum permissible velocities in ditches without protection against erosion shall be as set forth in the Design Criteria in the Engineering Report on the Turnpike.

Turnpike Drainage Structures

The invert of culverts and bridge channels under the Turnpike and under reconstructed local roads which serve as outlets for agricultural drainage systems shall be not less than 6 feet below the average field level adjacent to the upstream right of way line. For lands with prevailing slopes toward the Turnpike, this minimum depth may be modified as follows:

| Prevailing Slope | Minimum Depth |
|------------------|---------------|
| 0.00% to 0.25% | 6.0 ft. |
| 0.25% to 0.75% | 5.5 ft. |
| 0.75% to 1.50% | 5.0 ft. |

Where rock is encountered these minimum depths shall be reduced to provide only for the existing drainage systems. Where no drainage systems exist, but are future possibilities, the inverts shall be at least one foot below the top of rock in any upstream areas that may be subject to tile drainage. When outlet ditches are not available at these depths, the drainage structures shall nevertheless be constructed to the depths specified above as a provision for future improvements to the agricultural drainage systems.

The elevation of the inverts of culverts for streams draining more than 2000 acres shall be such as to permit future ditch improvements to provide a non-silting velocity ($2\frac{1}{2}$ to 4 ft./sec.) with 2:1 bank slopes.

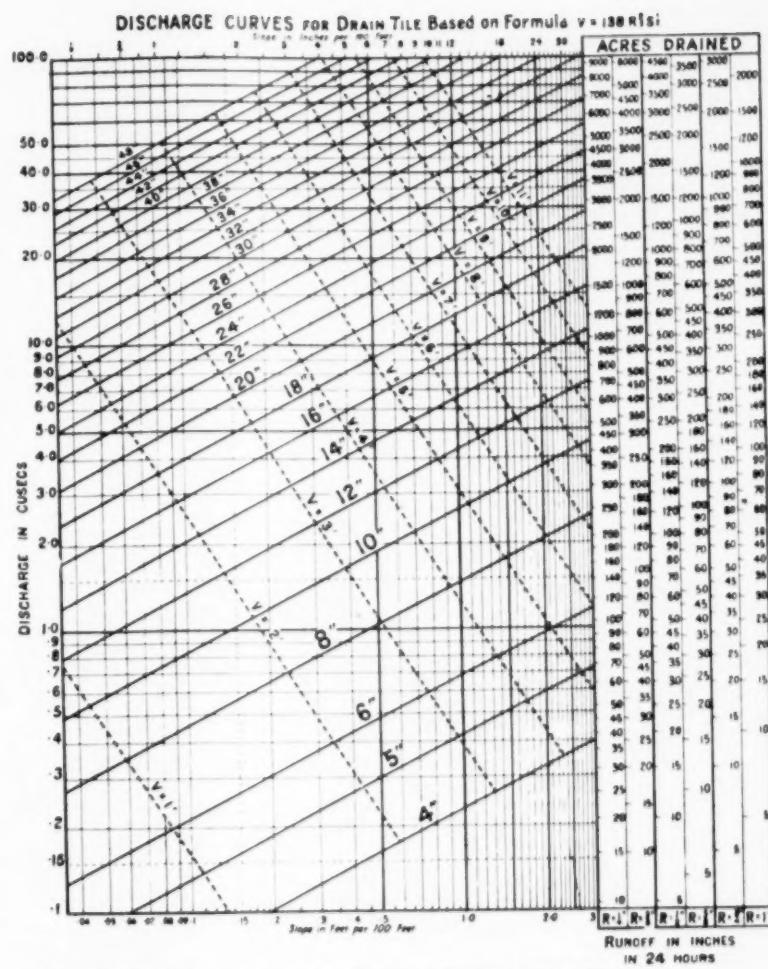
The inverts of culverts and bridge channels under the Turnpike and under reconstructed local roads shall be at least 3 feet below any low areas of tillable land, which do not have surface drainage, larger than 2 acres on the upstream side of the Turnpike or reconstructed local road, except where rock is encountered. When outlet ditches are not available at these depths, the drainage structures shall nevertheless be constructed to the depths specified above as a provision for future agricultural drainage.

Where no agricultural drainage system exists, but future agricultural drainage is evident, drainage structures under the Turnpike and under reconstructed local roads shall be reconstructed to the minimum depths specified in paragraphs 1 and 2 above.

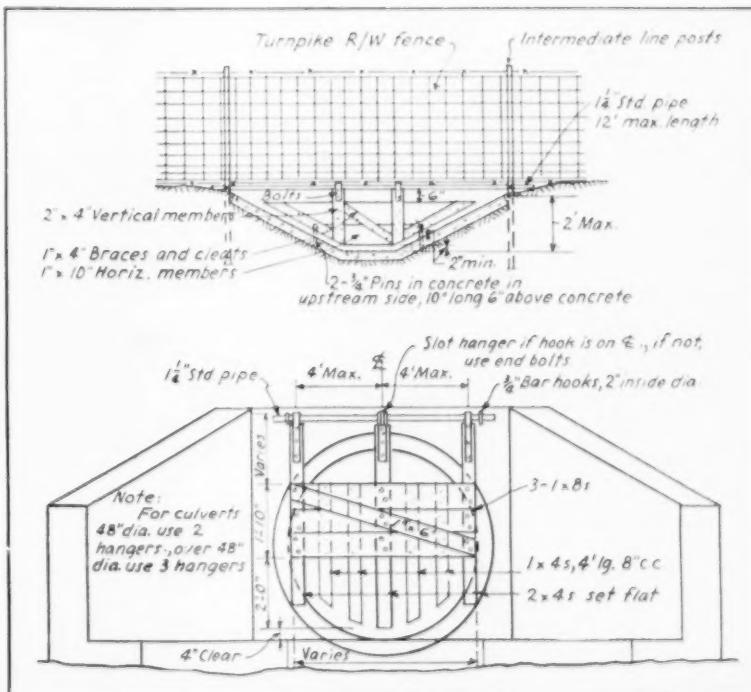
Borrow Pits

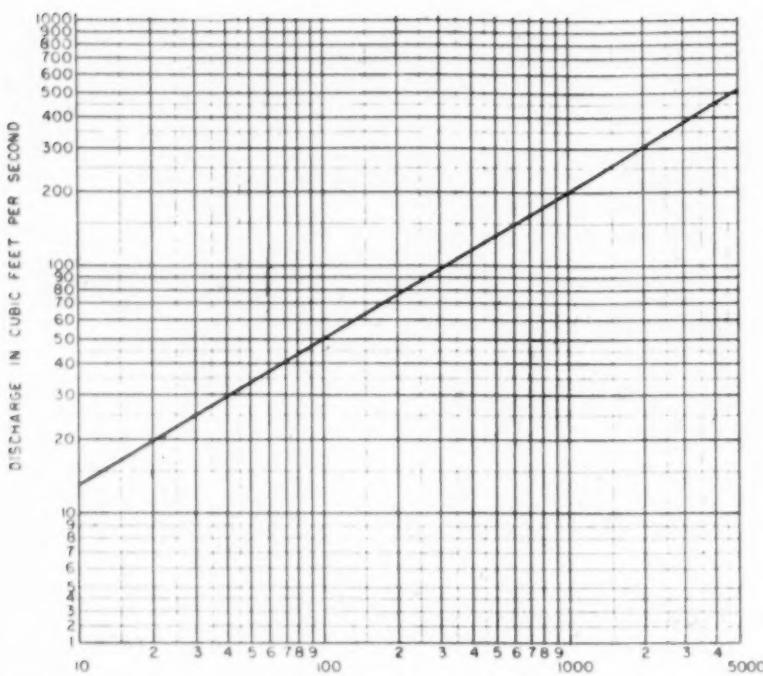
At various locations along the route of the Turnpike, borrow pits may be used to advantage as outlets for

★ Two of several standard trash gate designs to be used for paved and unpaved ditches along the turnpike, and for inlet ends of pipe and box culverts



★ Figure C—Tile drainage chart used in designing interceptors and outlets





★ Curve of drainage discharge used for the Turnpike work

agricultural drainage systems.

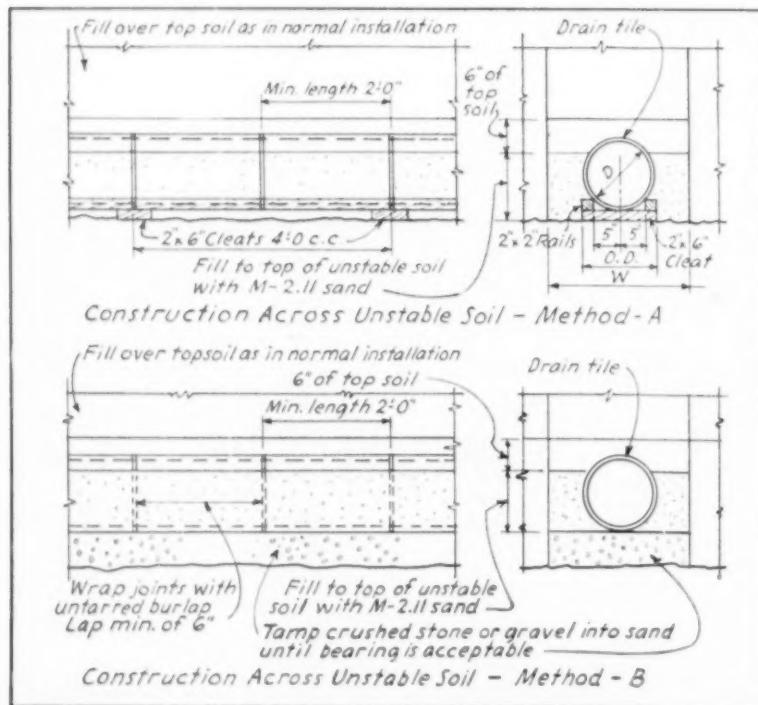
Borrow pits used in conjunction with drainage systems shall be outletted to natural stream channels or to other adequate water courses. The outlets shall be at such elevations that the surfaces of the water in the resultant ponds will be at elevations corresponding to the bottoms of any

ditches which would be required in lieu of the borrow pits.

Borrow pits where ponding results shall have a normal depth of water of not less than 6 feet over at least 50 percent of the area of the pond.

Drainage Details

Type and Use of Pipe—Use clay



★ Standard details for turnpike drainage

or concrete drain tile for laterals and mains. Use extra quality clay drain tile where the ground water contains 0.3 percent or more of magnesium or sodium sulphates. Use extra quality clay drain tile in muck or peaty soil or when the tile carries the drainage from muck or peaty soil, when the soil or the water from the soil has a pH value of 5.0 or less or a pH value of 8.0 or more.

All pipes installed under the Turnpike for agricultural drainage shall conform to the requirements for pipe culverts set forth in the Design Criteria of the Engineering Report.

Collector mains within 25 feet of water-loving trees which are not to be removed shall be constructed of bell and spigot sewer pipe with mortared joints, or of corrugated metal pipe.

Permissible Depths of Drain Tile

The depths of trenches in which drain tile is installed shall not exceed the following amounts for trenches of 24-in. maximum width; for wider trenches a special design shall be prepared:

| Tile Size | Max. Allowable Depth of Trench | |
|-----------|--------------------------------|---------------|
| | Stand. Quality | Extra Quality |
| 5" | 7.2' | 9.5' |
| 6" | 6.5' | 8.6' |
| 8" | 5.1' | 7.3' |
| 10" | 5.2' | 7.5' |
| 12" | 5.4' | 7.7' |
| 15" | 6.2' | 8.0' |
| 18" | 6.9' | 9.7' |

Alignment—Collector mains may be laid on a curved alignment, with a minimum radius of 50 feet. Where a radius of curvature of 5 feet cannot be obtained, use standard 45 degree and 90 degree bends of bell and spigot pipe, or use junction boxes.

The minimum radius of curvature for drainage ditches with bank protection shall be 100 feet. The necessity for bank protection shall be investigated for all ditches having radii of curvature less than the following:

| Width of Ditch at Top | Recommended Min. Radius of Curvature without Bank Protection | |
|-----------------------|--|---------|
| | Under 15' | 15'-35' |
| Under 15' | 300 | |
| 15'-35' | | 500 |
| Over 35' | | 600 |

Miscellaneous Structures—The following miscellaneous structures and appurtenances shall be employed as a part of the agricultural drainage systems wherever required to assure the satisfactory operation and maintenance of these systems:

(a) Connect laterals to intercepting collecting mains by means of standard tile fittings with the center line of the collector main not above the center lines of the intercepted laterals. Use Y-branches and bends as required.

(b) Use junction boxes where 2 or more large (12" and over) tile lines join or where several tile lines join at different elevations. Where possible install junction boxes away from cultivated areas. When a junction box is in a cultivated field, construct

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City _____ Zone _____ State _____

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top of box at least 12 inches below ground surface.

(c) Provide breathers every 1200 ft. on collector mains and at abrupt changes in grade. On collector mains crossing the Turnpike, provide breathers on both sides of the Turnpike, inside the right of way line.

(d) The outlet ends of all laterals or collector mains shall be protected by the installation of an endwall for outlet pipes. In lieu of installing an endwall, 2 feet of 16 gauge corrugated metal pipe may be installed at the outlet ends of the laterals or mains. Install gates or gratings on the outlet ends of all pipes serving agricultural drainage to keep small animals out of the pipes.

(e) Where surface water enters a ditch at the location of a tile outlet, divert the surface water to another location or provide a drop structure to protect ditch bank and outlet pipe. Use drop spillways, drop boxes or other suitable structures.

(f) Provide adequate means for lowering surface water at points of concentration from adjoining fields to the drainage ditches. Use ditch paving, drop spillways, drop boxes or other suitable appurtenances.

(g) Provide stock crossings at locations where cattle cross the course of a drainage ditch or at stock watering locations. Stock crossings shall be located at points where surface water cannot enter the ditch by way of such stock crossings.

Pave stock crossings where warranted by the use of a large number of cattle.

(h) Provide water gates where the Turnpike right of way fences cross drainage ditches, where such water gates are required for the protection of cattle.

Record Plans

As-built plans shall be prepared showing the alterations made by the Turnpike Commission to the agricultural drainage systems. The plans shall show the locations and elevations of all mains and sub-mains installed, all connections, the sizes of all tiles, the locations, types and elevations of all appurtenances, and the location, sizes and elevations of all ditches serving agricultural drainage constructed or altered by the Turnpike Commission. All elevations shall be referred to U.S.C. & G.S. datum.

Overtime oversight costly

Under the Wage-Hour Law any employer who fails, through oversight or otherwise, to pay overtime rates after 40 hours and who allows these cases to go to court, may face double penalty, the amount of the overtime plus liquidated damages of 100%, plus attorneys' fees. The employer may also be assessed a "compensatory fine" for any investigation made of his records, etc., upon complaint of an employee.—Virginia Road Builders Association.



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C-12

How on-Job Repairs Cut Shovel and Scraper Output

I—Shovels

This report is entitled "Classification of Maintenance and Repair Delays of 15 Min. Duration or More by Power Shovels on Highway Grading Jobs." The report, No. 22, marks resumption, by the Board's Special Committee on Highway Equipment, of the series of informational reports on performance, time utilization, and costs pertaining to equipment employed on highway construction and maintenance work. The first 21 reports in this series were issued during the period March, 1949, to January, 1951, by the Board's former Committee on Economics of Highway Construction and Maintenance Methods.

MAINTENANCE and repair delays of 15 min. or more each experienced by power shovels on active highway grading jobs account for a total down time of about 1.2 hr. out of every 10-hr. work day (weather shut-downs not considered part of work day). On some jobs down time due to such causes was double this amount.

The magnitude of these losses was

determined from studies conducted by the Bureau of Public Roads on 41 shovels in use on 31 projects during a work period of 4,500 hr. Individual studies cover a calendar period of about three weeks during the active construction season. This field study program has been in effect since 1947. On the basis of 276 maintenance and repair delays observed, one such time loss occurs every 16 hr. and is about 115 min. in duration.

Table 1 shows (1) the principal types of maintenance and repair delays encountered, (2) the percentage that each is of the total maintenance and repair delay time, and (3) the average duration of individual delays.

On many jobs "hard digging" was encountered in ledge rock, shale, and blasted rock. Such material obviously contributes to the likelihood of greater frequency of maintenance and repair delays to the power shovel. In some instances, however, opportunities exist with respect to minimizing the effect of poor digging conditions. Evidence of this fact is that some power shovels having the least delays are those which worked in rock which had been well blasted.

The analysis also revealed that

Table 1—Maintenance and Repair Delays of 15 Min. and Over by Power Shovels on Highway Grading Jobs; 276 Delays Averaged

| Type of delay | Total maintenance and repair delay time % | Average duration of each delay (min.) |
|---|---|---------------------------------------|
| 1. Power transmission system, clutches, brakes, gears, drums, controls, etc. except cable | 40 | 111 |
| 2. Boom and dipper assembly, except cable | 26 | 117 |
| 3. Wait for repair parts | 17 | 510 |
| 4. Car body and crawler assembly | 6 | 87 |
| 5. Motor | 5 | 94 |
| 6. Cable | 4 | 57 |
| 7. Other | 2 | 31 |
| Total | 100 | 115 |

Table 2—Maintenance and Repair Delays of 15 min. and Over by Rubber Tired Tractor and Scraper Combinations on Highway Grading Jobs

| Type of delay | Total maintenance and repair delay time % | Average duration of each delay (Min.) |
|--|---|---------------------------------------|
| 1. Wait for repair parts | 20 | 528 |
| 2. Tractor motors, transmission & drive assembly | 40 | 245 |
| 3. Tractor—other | 12 | 100 |
| 4. Power control unit | 11 | 136 |
| 5. Scraper control system—cable, hydraulic lines, etc. | 6 | 56 |
| 6. Scraper—other | 6 | 66 |
| 7. Greasing, oiling and refueling | 5 | 26 |
| Total | 100 | 137 |

shut downs due to weather and down time due to maintenance and repair were both at a maximum on those jobs upon which studies were made during the winter months.

Other important factors which affect maintenance and repair delays but which are difficult to evaluate specifically on a uniform basis, are the carefulness and efficiency of the operator, condition of equipment, scheduled and nonscheduled repair and maintenance practices, and so on.

II—Scrapers

The following is from Committee Report No. 23, Special Committee on Highway Equipment, Highway Research Board, May, 1953, entitled "Classification of Maintenance and Repair Delays of 15 Minutes or More by Rubber Tired Tractor and Scraper Combinations on Highway Grading Jobs."

MAINTENANCE and repair delays of 15 minutes or more each experienced by rubber tired tractor and scraper combinations on active highway grading jobs account for a total down-time to each unit of about 1.9 hours out of every 10-hour work day.

On some jobs down-time due to such causes was more than double this amount. The losses were determined from studies by the Bureau of Public Roads on 23 projects. Observations were made on 78 scraper units in use during a combined working period of 7,200 hours.

A total of 585 maintenance and repair delay occurrences were experienced. On the average, one such time loss of 15 minutes or more took place every 12.2 hours and averaged about 137 minutes duration. Weather shut downs were not considered part of the work day.

Table 2 shows the principal types of maintenance and repair delays encountered, the percentage that each is of the total maintenance and repair delay time, and the average duration of individual delays.

Various classes of excavation were encountered on these projects, ranging from easy digging in sandy soils to hard digging in material containing boulders and sizeable pieces of blasted granite. This latter type of material obviously contributes to the likelihood of greater frequency of maintenance and repair delays to the tractor scraper unit. Haul distances ranged from less than 100 ft. to more than 5,500 ft. over haul roads whose condition varied from poorly maintained to well maintained.

An analysis was also made of the relationship between shut-downs due to weather and down-time due to maintenance and repair. It was found that both were at a maximum on those jobs upon which studies were made during the winter months.

How Long is the Average Job Haul?

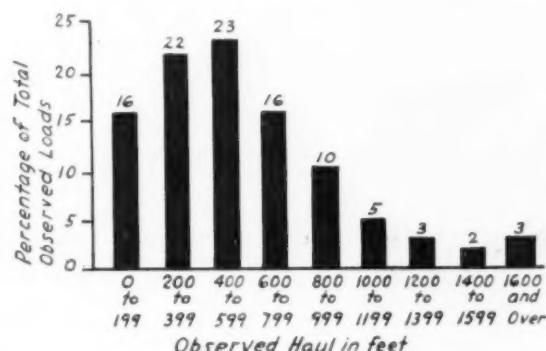
Interesting facts on the typical or average haul length on road grading jobs were summarized from recent studies by the Bureau of Public Roads Production Cost Unit. As dug out by the new Special Committee on Highway Equipment of the Highway Research Board, some of these tidbits of performance data are as follows.

1. (Report No. 23, June, 1953). Studies of crawler tractor and

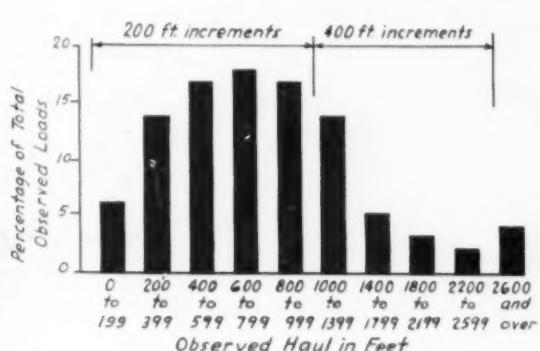
scraper combinations on road work show that the observed travel distance, or apparent haul, from end of loading to start of dumping, averaged 565 ft. The average covers 23 jobs in the past five years, selected at random and involving over 9,000 observations on 71 machines of all sizes. Longest haul, 3,600 ft. Chart shows how the haul lengths ran. Most were in the 200 to 600 ft. range. The

distances were about the same for all scraper sizes.

2. (Report No. 24, July, 1953). Studies of a similar nature on rubber-tired tractors and scraper combinations are covered in this report. Average haul distance was found to be 925 ft. on the 19 jobs covered, involving all sizes of scrapers from 6 to 14 yd. Longest haul seen was 5,800 ft. Hauls from 200 to 1,000 ft. were most common, as the graph shows.



★ Percentage distribution for various haul lengths for crawler tractor drawn scrapers



★ Percentage distribution for various haul lengths for rubber-tired tractor drawn scrapers

Franks, Kennedy advance at Cement Association

Carl D. Franks, for the past 14 months Executive Vice President of the Portland Cement Association, has been elected President.

The announcement was made by R. A. Hummel, Chairman of the Board of Directors of the Lone Star Cement Corporation and the Portland Cement Association. Announced also is G. Donald Kennedy as Executive Vice President, and E. F. MacArthur as Treasurer of the Association. Mr. Franks succeeds the late Frank T. Sheets.



★ Carl D. Franks

Mr. Franks who has served with the Association since it was established with its main offices in Chicago in 1916, was midwest regional manager for many years and later in charge of all the Association's promotional activities including the work of 27 district offices serving cement users in 46 states, the District of Columbia and British Columbia.

Mr. Kennedy joined the Association in January, 1950, as Consulting Engineer and Assistant to the President, and for the past year has served as Vice President. Mr. Kennedy was formerly Highway Com-

missioner of Michigan, is a past-president of the American Association of State Highway Officials, and from 1943 to 1950 served as Vice President of the Automotive Safety Foundation, Washington, D. C. In 1948 he received the George S. Bartlett award for "Outstanding Contribution to Highway Progress."

Calcium chloride in concrete

"Calcium Chloride in Concrete"; By William E. Dickenson, Field Engineer, Calcium Chloride Institute. Presented at Ready-Mixed Concrete Association of Wisconsin, Inc., Milwaukee, Wis.

A summary is given of the role of calcium chloride in shortening the setting and hardening period, and for cold weather concreting. By adding up to 2 per cent of chloride to concrete, initial set is obtained from one to three hours earlier than with normal portland cement concrete, under normal construction conditions.

At 70 deg. the one-day strength is doubled and 3 and 7 day strengths increased about 50 and 30 per cent respectively. CaCl_2 is especially recommended when curing under adverse conditions. There is no adverse effect on air entrainment in concrete, notes this paper, which gives typical case examples of concrete.



★ G. Donald Kennedy

New Ideas in Roadside Equipment

H—Second in a new series describing labor-saving units recently developed by manufacturers or by highway departments for roadside work. The author is chairman of the Highway Research Board subcommittee on Mechanization of Roadside Operations. (See also Roads and Streets, April and May, 1951, and June, 1953, for ideas previously described).



★ Picture 22

By Wilbur J. Garmhausen

Chief Landscape Engineer
Ohio Department of Highways, Columbus

Sod Cutter (Picture 22)

Towed by truck, tractor or jeep. The cutterbar is an arrow shaped plow which cuts one-half a strip of sod at a time on each side of the rolling coulter wheel. The depth of cut is regulated by a hand lever. The machine is steered by means of a handle bar so that the sod can be cut to a line by using a guide arm



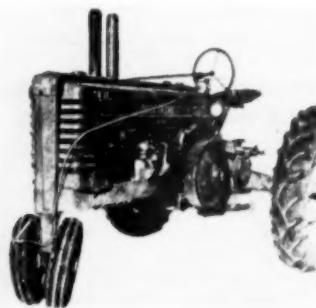
★ Picture 23

at the front of the machine. The rear wheels may be filled with gravel or water if desired.

Manufacturer: Clark Ranney & Sons, Gahanna, Ohio.

Aerifier (Picture 23)

This equipment provides aerification for turf areas. The F-G model Aerifier pictured cultivates and aerates soil beneath a turf cover, with a minimum of disturbance to the surface. Hollow spoons loosen the soil by removing soil cores, leaving numerous loose-walled cavities. Culti-



★ Picture 24



★ Picture 25



★ Picture 26

vation is adjustable from 1 to 4 in. depth.

The cultivating reel has nine discs which revolve independently on a fixed shaft, to minimize tearing when turns are made. Each disc is equipped with 12 hollow 1 in. or 1½ in. spoons spaced 4 in. apart at the base.

The machine with standard hitch can be pulled by any tractor. It may be equipped with a hydraulic lift unit, operated from the tractor, which raises and lowers the cultivating reel without altering the cultivation depth originally set. The single unit cultivates a swath 3 ft. wide. Available with flexi-press, a device which minimizes any disturbance of the turf surface, it holds turf down around each spoon, providing safe aerification for thin, shallow-rooted turf.

Manufacturer: West Point Lawn Products, West Point, Georgia.

**Tractor Speedometer Drive
(Picture 24)**

This piece of equipment can be attached to any tractor spraying equipment. It regulates the amount of chemical spray material used according to the speed the tractor is traveling. Contents of kit includes: speedometer head, flexible shaft (9 ft.), mounting clamp, support rod, and drive assembly.

Made by Stewart Warner Corporation, 1826 Diversey Pkwy., Chicago.

**Box Drag
(Pictures 25, 26, 27, 28)**

This piece of equipment is towed by a truck or tractor, either back of, or alongside the truck as pictured. Can be used with or without spreading new material. Constructed of 3-in. oak plank, the drag is 8 ft. x 4 ft. x 12 ft. in dimension. Steel runners are bolted to the lower side. Three blades and struts distribute and level the aggregate material.

The first strut, at an angle 15 in. back on one side and 33 in. on the other, distributes material to the pavement edge; consists of a 3 in. x 10 in. oak plank with a 4 in. x 10 in. slot for passing excess material into center compartment. A steel blade $\frac{3}{8}$ in. x 11 in. x 32 in. is bolted to this strut. Enlarged slots, 1 in. x 3 $\frac{1}{2}$ in., allows the blade to be adjusted. The blade extends 2 in. below the strut but does not cover the slot.

The middle strut and blade is designed the same as the first. It is placed at an angle, 58 in. back from the front of the drag on one side and 45 in. on the other, so that the material is distributed away from the pavement out toward the shoulder.

The third strut is also a 3 in. x 10 in. oak plank but the slot is only 4 in. x 6 in. The blade is 8 in. x 36 in. Strut and blade are placed at an angle, 70 in. back on one side, and 88 in. back on the other, so that the material is again distributed to the pavement edge.

A rear fin assembly is a steel blade, $\frac{3}{8}$ in. x 16 in., adjustable and bolted to the frame at an angle so that it will level out any excess material that is left after the filling and leveling process has been completed.

Two 3 in. x 6 in. x 4 ft. oak planks are bolted to the frame, front and rear, to allow a man to stand on the box to regulate the amount of material to be used. A stay bar at the front of the drag allows him a hand hold for security.

The drag can be constructed to any width, depending on width of shoulder to be maintained. For transportation the drag is drawn up and chained to the rear of the truck. An alternate provides wheels so drag may be lifted and towed. A roller may be attached if desired, to compact the material. Not available commercially.

Made by Ohio Department of Highways, Columbus.

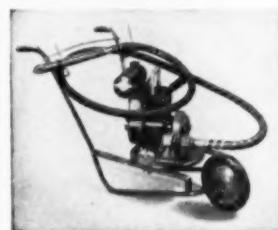
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HYCYCLE VIBRATION



Electric Flexible Shaft Master Vibrator (above) Gas Flexible Shaft Master Vibrator (below).



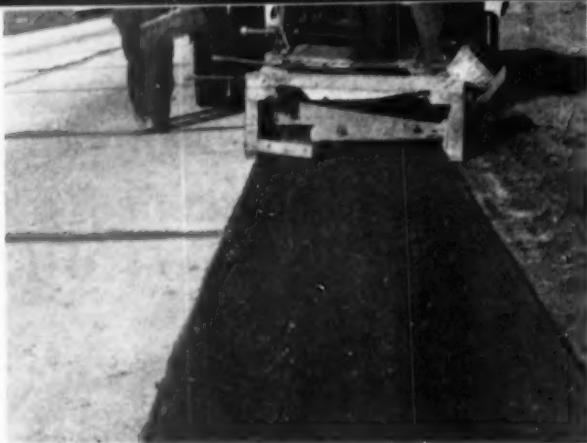
You get quick portability with **MASTER CHAMP** Hycycle Vibrator and two vibrating units. If you need or are using more than one vibrator . . . here's your answer to greater portability and lower cost operation. Rated vibration speed is 10,000 rpm. Also operates one vibrator and 600 watts of light or provides 1,200 watts of lighting through both single phase outlets. And for standard requirements **MASTER** provides its regular Portable Gas or Electric Flexible Shaft Vibrators. See illustrations at left. The electric vibrator provides dependable vibration where electric power is available. The gas model provides vibration where the extreme portability of hycycle operation is not required.

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★ Picture 27

Large Vacuum Sweeper (Picture 29)

A motorized suction pick-up unit for roadside trash, has a motorized 14-yd. hopper powered by a 6 cylinder heavy duty industrial engine, mounted on heavy duty dual wheels. Complete with intake hose and with adjustable upholstered operator's seat, adjustable foot rest, stop and tail lights, warning signals, electric brake and safety chains.

It picks up through a 12 in. diameter hose into an air-tight compartment; flexible hose has 6 ft.-7 ft. reach from either side. Air flows through the upper-inner filters into air ways beneath the solid top and immediately to the rear of the front panel. The filtered free air is discharged from the sweeper through the exhaust by the blower rotor.

When the body is filled, it is readily emptied by its own mechanism.

Manufactured by Good Roads Machinery Co., Minerva, Ohio.

Chipper (Pictures 30, 31, 32)

This chipper has been developed in various sizes and models, powered by a separate engine (Picture 30) or by a power-take-off (Pictures 31, 32). It consists of a cylindrical steel cutter head having cutter blades held in place by steel wedges.

The cutter head is housed by a cast steel housing which supports the bearing cases and provides a wide

★ Picture 30



★ Picture 28

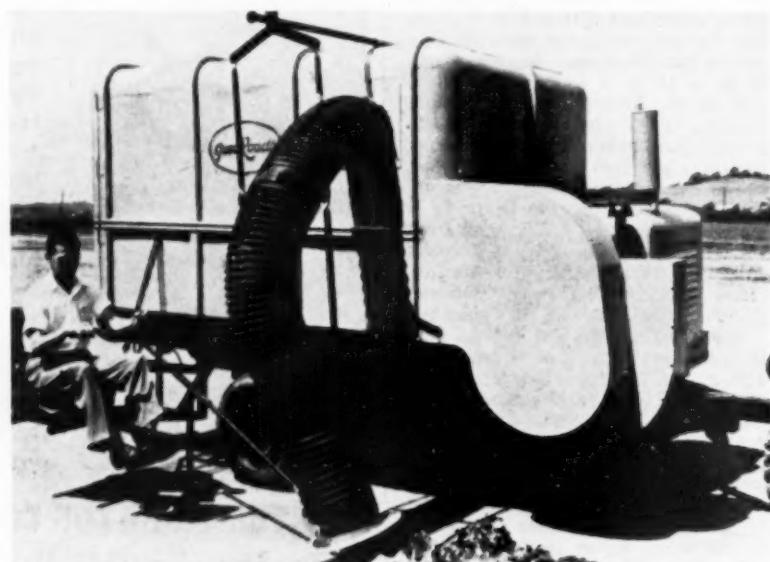
angled opening for feed on one side as well as an opening for the discharge of chips on the other. In the base of this housing is mounted the bed knife which can be adjusted with its edge parallel to the edges of the moving cutter blades and so close as to prevent sticks passing through until reduced to chips.

At the bottom of the feed opening in the housing, is a spring-loaded

feed plate mounted on a moveable hinge pin near outer end of opening and supported by springs and a spring rod at the front, limited in its upward movement by spring rod adjusting screws with locknuts.

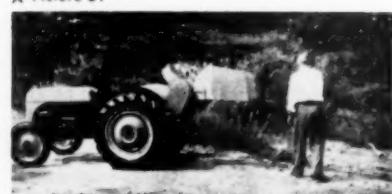
The machine will grind from 2000 to 3000 lb. brush per hour, handling branches up to 6 in. diameter.

Manufactured by Fitchburg Engineering Corporation, Fitchburg, Mass.



★ Picture 29

★ Picture 31



★ Picture 32



Dow

THERE ISN'T ANY DUST ON A DOWFLAKE-TREATED ROAD!

DOWFLAKE keeps gravel roads from blowing away, makes
them safer and protects surrounding area



Economy . . . safety . . . goodwill . . . all result from treating unpaved roads with Dowflake® (Dow calcium chloride 77-80%). And all are extremely important to road officials and the community.

Dowflake draws moisture out of the air, keeping the road damp, the dust down. Roads can't "blow away" due to heavy traffic and hard winds. This cuts down repeated gravel replacement, saves high material and labor costs.

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appreciate the benefits of Dowflake, too. It keeps the house free of dust; laundry can be hung out without fear of its getting dirty. The farmer's crops grow better and bring more on the market when they aren't laden with dust and dirt.

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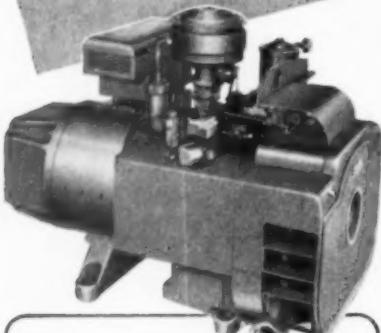
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Roadside Vegetative Cover Research in New York

VEGETATIVE cover for highway roadsides was the subject of a research project in 1951 and 1952 by the New York Department of Public Works, Landscape Bureau, the U. S. Bureau of Public Roads cooperating. The project and its findings have been summarized in a report, "Roadside Vegetative Cover Project," assembled cooperatively by the New York department and a group of leading authorities, with Cornell and Rutgers universities participating. Norman M. Wells, bureau director, and Harry H. Iurka, senior landscape engineer with New York state, directed the project.

Following are conclusions with credit line for the authority for each statement. While developed for New York state, the conclusions are believed by the authors to be applicable in many instances to other parts of the country.

Conclusions were reviewed by all Consultants and Cooperators and approved except as noted in italics.

Soil

1. Good vegetative cover can be established by good seeding methods, even on poor A-horizon, B-horizon, C-horizon, fill and "made" soils, and mechanically stabilized soils of the northeast United States.

Satisfactory vegetative cover can usually be established by turfing methods on the above soils.—Madigan.

Good vegetative cover can nearly always be established by good seeding methods on the above soils.—Tedrow.

2. To maintain a good vegetative cover the soil fertility level must be adequate. On sandy soils maintenance of the necessary fertility requires more attention to an intelligent fertilizing program than on other soil types.

3. Good grass cover was established on soils with silt plus clay content as low as 5%. Some of these projects employed maintenance fertilization practices. Although no definite lower limit of silt plus clay can yet be established, the data point to successful maintenance of cover on soils with fines as low as previously indicated. Certain soils may be so dense as to prevent root penetration and restrict plant establishment.

4. Minimum nutrient requirements for establishment of satisfactory cover on each soil class can not yet

be defined and further study is needed.

Several of the variables affecting the establishment of adequate turf can be identified by the soil area approach. The pedological system of soil identification takes into account climatic conditions, slope, parent material, pH, organic content and to a lesser degree, fertility. The identification used in this report, in which all soils are divided into three major classes, each of which has three subdivisions, is primarily a textural classification in which other factors, such as nutrient storing abilities are implied. It does not relate, for instance, the relative acceptability of sands in the Adirondacks to sands in Long Island.

The work on soils that has been done to date clearly shows the importance of certain variables in relation to the establishment of vegetative cover. With the knowledge that has been gained to date, further progress could be made by relating the soil data now on hand to the pedological identification system.—Bureau of Soil Mechanics, New York State Department of Public Works.

5. Good cover was established and maintained at pH values from 5.5 to 7.5. Any pH values below 4.5 have a detrimental effect on the establishment of vegetative cover.

Lime should be applied for turf only when soil tests and experience with the soils indicate it is necessary. For example, Kentucky blue grass grows exceedingly well on Munising sandy loam having a pH of 4.0 to 4.5.—Tyson.

The pH limit of 4.5 is entirely too low for safety for most of the herbaceous material used for slope control. pH 5.5 is preferred. Establishment is possible at 4.5 but persistence of cover will not be nearly so good as at a higher pH level.—Musser.

6. Although organic matter is a valuable aid to the establishment of vegetative cover, successful stands were obtained at organic matter levels as low as 0.5%.

Once grass is established it will generate its own organic matter or humus in the soil.—Monteith, Tyson.

7. Low moisture-holding capacity of a soil limits plant growth unless a good supply of moisture is available.

8. The density of mechanically stabilized soils with present day compactive effort does not provide a condition which prevents the establishment of good grass cover.

9. Since the projects reported are typical of conditions generally on New York State highways, it is obvious that large savings can be made by not requiring topsoil. Bid prices for topsoil furnished are generally \$3 per cubic yard and have been as high as \$7. Eight hundred cubic yards per acre for a 6" depth would cost from \$2400 to \$5600. The cost per acre of maintenance fertiliz-

ing on even those poorer soils which might require annual fertilizing would be approximately \$14 for material and \$10 to \$15 for application or a total cost of from \$480 to \$580 over a twenty year period. Thus when fertilizer is used instead of topsoil there is a minimum saving of \$2000 per acre.

Fertilizing of topsoil would in most cases be necessary, as few topsoils are sufficiently fertile. This increases the saving by not topsoiling. Cale.

10. Productive soil on a job should be utilized as far as possible. Economies of over \$1 per cu. yd. can be effected, however, by including the saving and placing of this material under the pay item of unclassified excavation. This has been done on contracts in the Babylon District of the New York Department of Public Works and is handled in a similar manner in the Civil Aeronautics Administration's Specification P-152.

11. A concomitant benefit from the use of subsoil as a growing medium is its lower weed seed content, which should provide less competition to the stand of desired turf.

Stability

Soil slopes must be in a condition of equilibrium before an attempt is made to stabilize them against erosion by wind or surface water, regardless of the method of vegetating.—Bureau of Soil Mechanics, New York State Department of Public Works.

Sodding

12. The data presented show conclusively that sodding is not essential for erosion control except where an immediate turf cover is required. Bids recently received by the New York State Department of Public Works on sodding have varied from \$0.80 to \$2 per sq. yd. with an average of \$1.19 per sq. yd. or \$5700 per acre. The same results may be obtained by seeding at a saving of at least \$5000 per acre without increase in maintenance cost.

13. Where sodding is required, it is no more necessary to use topsoil than for seedings.

Planting

14. Planting for erosion control costs at least \$2400 per acre based on the very low price of \$0.50 per unit planted and a spacing of three feet on centers. Seeding methods provide a better immediate cover and as good a permanent cover with a saving of at least \$2000 per acre for establishment. Even if fertilizing should be required every year for twenty years the saving would still be at least \$1400 per acre.

The planting of vines and shrubs is a distinct advantage on slopes having certain types of soil and certain degrees of slope.—Deaking, Garmhausen.

Seeding

15. Two major causes of high bid prices for seeding received by the New York State Department of Public Works may be mentioned. One was the specification of incorporating humus in soil at a cost of from \$7 to \$10 per cu. yd. or \$600 to \$1000 per acre. There is no need for such a soil amendment. Fertilizing would do a better job at less than half the cost. The other cause is the seeding specification, requiring many operations, particularly when these involve much hand labor.

Further savings can be made by reducing the rates of seeding to as little as 15 to 25 lb. per acre.—Tyson.

Fertilizing would do an adequate job.—Tredrow.

Fertilization and Liming

16. An adequate supply of available plant food is essential for successful plant establishment and continued growth. To provide this many soils require the application of lime and complete fertilizer.

Seed Bed Preparation

17. A fairly rough seed bed usually meets all requirements, a fine surface being actually undesirable. This condition usually obtains immediately after grading without additional tillage. The degree of surface finishing depends on the kind of maintenance.

There should be enough loose soil on the surface to provide for coverage of the seed.—Morrish.

No cultivation is necessary when mulch is used.—Wright.

18. Rolling is not required for seeding establishment on most soils. On heavy soils it may promote serious soil crusting.

Germination is quicker and more uniform on soil firmed with a cultipacker after sowing on soil fluffed by seed bed preparation.—Hunter.

Adapted Plants and Seed Mixtures

19. Grasses as a group are superior plants for roadside vegetative purposes.

20. The low growing, late maturing, leafy perennial grasses which propagate by underground vegetative means are most desirable and require a minimum of maintenance.

Some grasses which do not propagate by underground vegetative means are more tolerant of sandy and clay soils.—Tyson.

21. Plant species should be selected which are adapted to the soil, climate, plant food and lime levels, and purpose and management to be imposed.

22. Simple seeding mixtures are superior to the "shot gun" type.

23. Rapid growing cereal nurse crops provide quick temporary cover.

(Continued on page 94)

WHAT'S NEW...

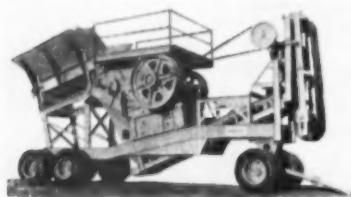
in Construction and Road Building Equipment, Materials and Supplies

On bound-in post card please fill in description of item on which more information is desired. The card is provided for your convenience in making inquiry and in obtaining catalogs or other data. Card works for both advertising pages and reader items.

Drop post card into outgoing mail. No stamp is required.

Jaw Crushing Plant Features Vibrating Grizzly

A new Cedarapids portable primary crushing unit, Model AAA-GR, has been completely redesigned from previous Cedarapids models to incorporate a vibrating grizzly to act as a by-pass for materials under crushing size. This new design reduces the load on the jaw crushers, and



Model AAA-GR Crushing Plant

insures larger crushing space, higher capacity and lower maintenance, according to the manufacturer, Iowa Manufacturing Co., Cedar Rapids, Iowa. Model AAA-GR retains all the features of previous Cedarapids models, but has been improved with additional refinements in design and construction. The outstanding feature of this new unit is the vibrating grizzly which eliminates dirt and fines from material before they reach the crushing chamber. Material passing through the grizzly bars drops into the by-pass chute and discharges onto the under-crusher conveyor which carries it to the next crushing unit. Use of the vibrating grizzly is claimed to make the Model AAA-GR especially effective for obtaining peak production in gravel and quarry operations where a high percent of the raw material is below the 2½ in. to 6 in. range of size, depending upon the finished product size desired. The vibrat-

ing grizzly is stated to also provide a definite advantage in wet or sticky material that would not normally pass through a stationary grizzly, or which might stick to the crusher jaws causing compaction or plugging of the crusher.

Chemical Spraying for Weed Control

A new tractor drive pump for spraying of chemicals, announced by Hanson Chemical Equipment Co., Box 270, Beloit, Wis., is claimed to offer superior operational and material characteristics. This new Hanson Ni-Resist, nylon roller pump pro-

vides as follows: Low underdrive 2.14 to 1; medium underdrive 1.24 to 1; direct 1.00 to 1; overdrive .86 to 1. This development is stated to be based on field studies started as long ago as 1936. Advantages claimed for this unit are its combination of low-underdrive or "break-away-gear" with the three "progressive" ratios of 1.24 to 1, 1 to 1 and .86 to 1. Top usefulness of Model 6041 is said to be for on and off-highway maneuvering of heavy-tonnage loads of all types—but the "progressive" ratios also provide proper gearing for out-maneuvering ordinary highway traffic.

Huber to Furnish Caterpillar Engines for Rollers

Huber Manufacturing Co., Marion, O., has announced the availability of a Caterpillar engine for its line of 8-12 and 10-14 ton tandem rollers. It is the Caterpillar Model D-315 diesel engine, which develops 66 H.P. at governed speed. The engine has a 4½ in. bore, a 5½ in. stroke, and 350 cu. in. displacement. Huber currently furnishes Hercules gasoline and diesel engines for this line and will continue to do so. These are the Hercules JXD (gasoline) and Hercules DJXC (diesel).

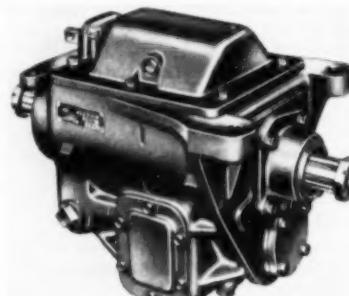


New Hanson Ni-Resist Nylon Roller Pump

duces pressures from 0 to 350 PSI and discharges liquids at rates up to 15 GPM. It can easily be mounted on any tractor PTO shaft or can be base-mounted for engine drive. This pump is self-priming and requires no lubrication.

New 4-Speed Auxiliary Truck Transmission

A new 4-speed auxiliary transmission for heavy duty truck operation has been announced by H. S. Watson Co. This auxiliary, Number 6041, is suitable for engines that have torque of about 375 ft. lbs. Its



Model 6041 Transmission

Hydraulic Power Shovel Added to Brady Line

A hydraulic power shovel has been added to the line of Brady Mfg. Co., 5 E. 30th and Granger, Des Moines, Iowa. The company has arranged to manufacture a detachable version of the Lessmann Power



Lessmann Jr. Loader Model FA

shovel under Lessmann patents. The Brady version has been named the Lessmann Jr. Brady engineers adapted the original shovel unit to make it detachable. This makes it possible to convert a standard Ford or Ferguson tractor to a power shovel easily at any time. The new shovel employs hydraulic crowder arms for ramming to load the bucket, rather than tractor power. After the bucket is loaded and raised to the proper height, the arms are retracted to throw the load on the rear wheels, further reducing the strain, and allowing easier steering and excellent maneuverability. Because of the scientifically controlled leverage in the hydraulic crowder arms, it is stated Ford and Ferguson tractors can easily handle from $\frac{1}{2}$ to $\frac{3}{4}$ yd. buckets.

Bulk Material Handler Is Highly Maneuverable

A new Scoot-Crete bulk material handler has been announced by Getman Brothers, South Haven, Mich. This new 3,000 lb. capacity unit, known as the Scoot-Crete Model N-52, is Diesel powered. An accessory is a "Scrubber" that reconditions exhaust gases. The highly maneuverable N-52 will turn within its own 90 in. length because of its caster steering. Is

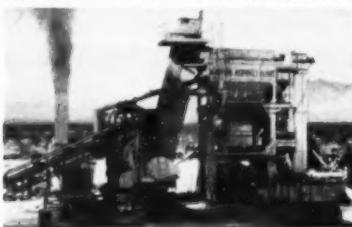


Scoot-Crete Model N-52

13 in. wide and the operator's head is about 68 in. above floor level. Gross empty weight is approximately 1,100 lb. Operating speeds range from 1 to 15 mph through standard truck transmission. An automatic transmission having a high-speed forward and reverse is available at extra cost. The Scoot-Crete is equipped with either flat rack or 14, 16 and 20 cu. ft. dump box bodies. These can easily be interchanged on the job in just a few minutes.

Asphalt Plant Has New Engineering Features

A newly engineered and improved 4000-lb. batch capacity asphalt plant, announced by Madsen Iron Works, Inc., Huntington Park, California, is designed to handle the most exacting requirements of today's bituminous mix specifications on a fast production basis. According to the manufacturer, the new Model 481 incorporates many engineering features never before offered in an asphalt mixing plant. The plant is oversize throughout. It has larger elevator, screen, bin, weigh-box, mixer and drives. While designed as a 4000-lb. plant, the Model 481 is engineered so that it may be modified at a later date to handle 5000-lb. or 6000-lb. batches. The method of withdrawing materials from the 4-compartment aggregate bin in this new plant is said to be unique in the industry. The materials from each compartment are withdrawn from three openings (patent applied for), one in the center and one at either



Madsen Model 481 4000-lb. Batch Type Asphalt Plant

edge of the bin bottom. When the single gate which covers the three outlets is opened, the material in the bin is drawn down from the two bin sides and the center. This is said to eliminate "coring out" and segregation, to provide a more uniform withdrawal of material and to provide a more active bin condition. The opening of each (triple charge) bin gate is accomplished by means of a single air-operated cylinder. This fast action air operation is stated to reduce operator fatigue and to speed up the cycling time from bin to truck. The bin in this new 4000-lb. plant has a capacity of 47,800 lb.

Jackson Vibrating Paving Tube Has Added Power

A much more powerful vibrating paving tube has been brought out by Jackson Vibrators, Inc., Ludington, Mich. The vibrating tube assembly, which attaches to either the front of a finisher or the rear of a spreader, consists of two to five vibrating elements, according to the width and depth of slab, each embodying two rather closely parallel tubes on which is mounted a powerful, vibratory, submersible motor. Current is supplied by power plant mounted on the parent equipment and the tube is raised and lowered into the concrete by the finisher or spreader operator. Thus thorough and complete internal vibration is furnished through the full width and depth of the slab, according to the manufacturers who state that with the added power now supplied, the Jackson paving tube will handle the largest and thickest slabs with dispatch.



Jackson Vibratory Paving Tube Attached to Standard Paving Finisher

Sauerman CRESCENT SCRAPERS



dig, haul and place more yardage faster—at lower cost!

Reduce difficult dig-haul-piling jobs to a simple, single operation with a Sauerman Crescent Scraper. Sizes range from 1/3 to 15 cu. yds. to cover the needs of material handling jobs . . . large or small.

The Crescent, with rugged toothed-blade, penetrates the hardest material with plowshare ease. The unique bottomless scraper gathers a full load on the forward pull and hauls at ground level to the discharge point for an instantaneous, clean dump. A single operator situated in a safe, comfortable cab overlooking the work area, automatically controls all the digging, hauling and dumping operations.

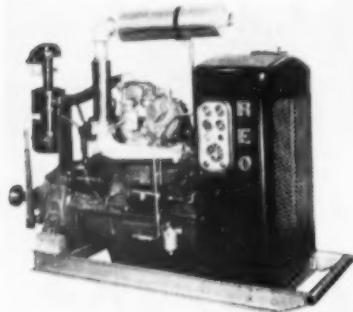
Sauerman Scrapers are reasonable in first cost, simple and economical to maintain. Engineered to combine sturdy construction and wear-resistant lightweight metals, the Sauerman Crescent Scraper gives you small power consumption—diesel, gasoline or electric—compared to tonnages handled. Scrapers installed more than twenty-five years ago are still giving trouble-free service and are considered as good as new by their owners.

Write today for Catalog J for full information about the Crescent Scraper. Sauerman Bros., Inc., 588 S. Clinton St., Chicago 7, Ill.

SAUERMAN BROS., INC.
EARTHMOVING EQUIPMENT SINCE 1909

Reo Enters Industrial Power Plant Field

The Industrial and Marine Engine Division of Reo Motors, Inc., Lansing, Mich., which was activated early in the year, has completed design work on a series of spark ignition industrial engine models for use with gasoline, natural gas fuel, liquefied petroleum gas or dual fuel combustion. The new engines were formally



New Reo Engine for Liquefied Petroleum

introduced May 14 at the International Petroleum Exposition. Reo is entering the industrial power plant field with a line of six-cylinder, four stroke cycle engines of 292- or 331-cu. in. displacements, or twin six-cylinders 331-cu. in. units. Maximum basic engine output for these units at 2500 rpm is 105, 120 and 210 H.P., respectively.

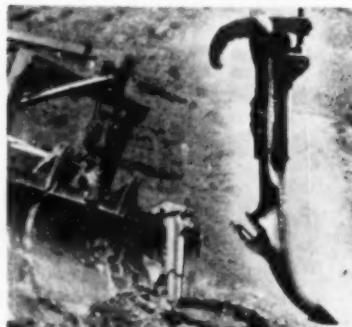
Controls Stack Dust from Asphalt Plants

A completely new system for controlling stack dust, produced by Johnson-March Corp., Philadelphia 3, Pa., is especially adapted to the control of dust from the stacks of asphalt plants. The system, combining six different principles of dust precipitation, is capable of removing extremely large volumes of dust from the stack gas. Its operating efficiency, even at the extremely high dust loadings found in asphalt plants, is stated to assure freedom from air pollution and the end of dust

nuisance. The device is known as the Johnson-March liquid precipitator multiple-action scrubber (Type V). It is built in various sizes for capacities ranging from 1,500 cfm to 48,000 cfm. Many years of engineering experience in liquid dust control systems have gone into the development of this liquid precipitator scrubber. All of the dust removed from the air is reduced to a watery sludge which can be discharged into a tank or pond for easy removal of the solids. A recirculation system can be used where water supply is a problem. For best results, the system requires approximately 2 gal. of water per minute at 40 to 50 psi for each 1,000 cu. ft. of gas per min.

New Heavy Duty Ripper

A new over-the-mold-board heavy duty ripper for all medium and large dozers has been added to the line of Hensley Equipment Co., 816 98th Ave., Oakland, Calif. It is stated that carefully selected and heat treated steels make the ripper

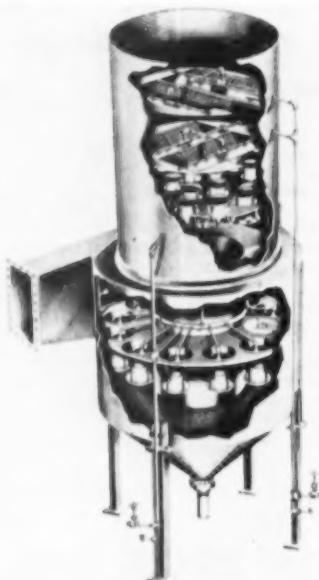


New Hensley Heavy Duty Ripper

rugged enough to absorb the toughest ripping jobs. It is stated to be a valuable tool for the contractor where grade has been lost or corner cuts required. Up to six units can be used on a dozer for grubbing, clearing and rock raking. The complete unit weighs approximately 30 lbs. This feature is stated to make it possible for one man to handle the ripper.

Self-Powered Ditcher in Low Cost Field

A new low cost, self-powered ditching machine is now being manufactured by Vermeer Manufacturing Co., Pell, Iowa. It is stated the Model 6 Vermeer Pow-R-Ditcher, illustrated herewith, will dig up to 18 in. wide at a regulated speed of 1 ft., 2 ft. or 3 ft., per minute. Maximum digging depth is 6 ft. It is stated perfect balance affords simple hookup and easy trailing from car, truck or jeep. "Level-Matic" wheels allow straight up-and-down digging



Model "L.P." Multiple Action Liquid Precipitator Scrubber

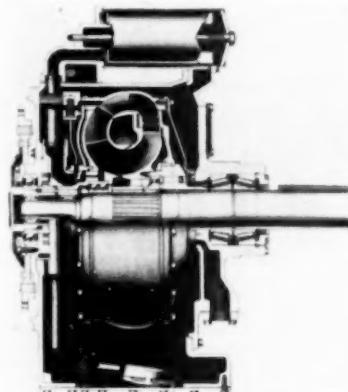


Model 6 Pow-R-Ditcher

on slopes. The Pow-R-Ditcher is self propelled by Wisconsin air-cooled engines. The ditcher is available also in two additional models: Model 24, which has a 24 in. digging width; and Model 6-V, with an adjustable V-blade for digging drainage ditches.

Two-Stage Hydraulic Torque Converter

A new two-stage hydraulic torque converter, designed to fill the gap in industrial hydraulic drives, has been announced by Twin Disc Clutch Co., Hydraulic Division, Rockford, Ill. The converter develops up-to-4:1 torque multiplication at stall, combined with progressively increasing engine speed during acceleration and uniform

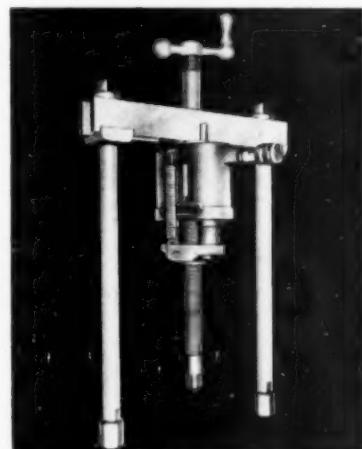


Model SD Two Stage Hydraulic Torque Converter

pull-down under load. Thus it meets the requirements of certain engine applications needing converter drive with specific performance characteristics. Principal feature of the Twin Disc two-stage converter is its free-wheel reaction or stator blades, which provide complete unloading of the engine at high-speed, no-load conditions—with low horsepower absorption, and minimum cooling requirements.

OTC Adapts Hydraulic Rams to Push-Pullers

The OTC push-pullers have been adapted by Owatonna Tool Co., 417 Cedar St., Owatonna, Minn., to the OTC center-hole hydraulic rams. Four sizes of push-pullers with a complete assortment of attachments and adaptors can now be used with hydraulic power to speed up maintenance pulling and installing operations involving gears, bearings, sheaves, pulleys, pinions, couplings, etc. Capacities from 17½ to 50 tons are available. Users already having an OTC push-puller may adapt it for use with the center-hole ram by ordering an inexpensive attaching plate.



Push-puller Adapted to Center-hole Hydraulic Ram

It Measures While You Ride

Rolatape, Inc., 1741 Fourteenth St., Santa Monica, Calif., manufacturers of wheel type measuring instruments, have designed a new type extension handle for their Model 400 for operating out of any standard moving vehicle. The new handle



Model 400 Rolatape with New Handle

has greater rigidity and longer length which gives greater driver comfort and ease of operation. The Model 400 is designed for long distant measuring. Rolatape Model 400 is one-man operated and can register over 18 miles.

Trafficcounter Counts by Photo Electric Beam

A new trafficcounter, perfected by Streeter-Amet Co., 4101 Ravenswood Ave., Chicago, Ill., counts by photo electric beam the number of cars passing on a highway. The breaking of a photo electric beam automatically counts and records the passing of cars. It is ruggedly constructed for permanent, year-round operation in any

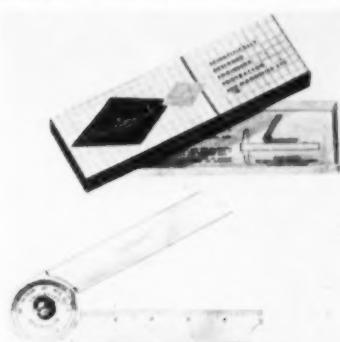


Ametron Electric Eye Trafficcounter

weather. It prints totals each hour and resets to zero; it identifies the count with a printed record of the exact hour—day or night. This new vehicle counting and recording instrument fulfills exacting requirements in installations where conventional roadbed type detecting elements are not desired. It is a permanent station type, capable of counting up to 1000 pulses per minute. The magnetic counter is solenoid advanced, once for each contact closure (whenever there is an interruption in the light field).

New Concept in Engineers Protractor Design

A new concept in adjustable, engineers protractor design and adaptability has been announced by the Way-Mac Manu-



Tractograph Protractor

facturing Co., 8112 Melrose Ave., Los Angeles 46, Calif. Called the Tractograph, it is a miniature drafting machine in itself. Any number of angles, from zero to 180° can be drawn instantly without turning, sliding, or moving the protractor out of position at any time. Simply swing upper rule arm to desired angle and lock adjustment knob. A magnifier, built-in over the registration mark, gives clear, hairline adjustment every time. Dial is white and easy to read. The 180 degree arc is calibrated in sharply defined 1° and 5° divisions.

New Bendix Radio Transmitter-Receiver

Latest addition to the line of two-way radio equipment manufactured by the Bendix Radio Communications Division, Bendix Aviation Corporation, Baltimore 4, Md., is a new FM transmitter-receiver complete with controls, associated power supply, antenna and microphone mounted in a single housing. Weighing approximately 50 lb. and operating in the 152-174 megacycle band, the "Multi-Master" can be used as a fixed or a mobile unit.

Pippin Excavator Completely Re-Engineered

A completely re-engineered model of the tractor-powered hydraulic Pippin excavator, placed on the market by Pippin Construction Equipment, Inc., White River Junction, Vt., is even more sturdy and powerful than previous models. It attaches to light tractors such as Ford and Ferguson, and is being adapted to other makes of tractors. It excavates over 10 ft. deep,



New Model Pippin Excavator

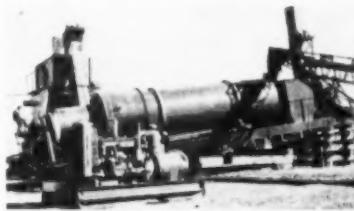
and will lift to a height of 12 ft. for truck loading. Its 16 ft. reach behind the tractor means that a 10 ft. long trench can be dug without moving the tractor. Wider side swing (12½ ft. from center) allows piling of dirt farther from the excavation. Besides heavier construction throughout, the power of the bucket is stated to be increased 300% through hydraulics and leverage. The excavator is rigidly supported by its two hydraulic stabilizers, which relieves the tractor of the working stresses, and is claimed to assure digging of plumb ditches on uneven ground or on slopes up to 15°. The greater hydraulic tank capacity provides better oil cooling under extreme working conditions. A wide variety of buckets, back-hoes and shovels greatly increases the excavator's usefulness.

Covered Glass Reticles on Gurley Instruments

Covered glass reticles which permit cleaning of surveying instrument reticles without danger of destroying the fine lines, are now a feature of Gurley transits and levels, manufactured by W. & L. E. Gurley, Troy, N. Y. With the covered glass reticle, any dust which may drop on the surface of the glass will not be in the focal plane of the crosshairs. There can be no effect of a "spotted" reticle. The Gurley cover glass is cemented in place over the pattern.

New Portable Bituminous Plant Developed by Pioneer

A new medium size, central hot mix bituminous plant, featuring portability and all-electric drive, has been announced by Pioneer Engineering Works, Inc., Minneapolis 13, Minn., subsidiary of Poor and



Model 81 Bituminous Plant

Co., Chicago. The plant, Pioneer's Model 81, has a rated capacity of 60 to 80 yd. per hour, utilizing a 72 in. x 24 ft. drier. It operates on the continuous process principle. This Model 81 plant consists of two main units. One unit are the burner, combustion chamber, drier, dust-collector and fan, all mounted on a single pneumatic-tired chassis. On the other unit are the gradation screen, three aggregate compartment bin, continuous apron feeder, mixer elevator and pugmill, also on a single pneumatic-tired chassis. The feeder, hot elevator and cold elevator can be moved on their own wheels or readily loaded on a truck for quick transport. The entire plant is electric driven, with individual motors for each functioning unit.

New Line of Mack Trucks Introduced

A completely new truck line has been introduced by Mack Trucks, Inc., 350 Fifth Ave., New York 1, N. Y. Designated the B Series Macks, the new line includes both trucks and tractors in four and six-wheel types, covering a range from 17,000 lb. GVW through 70,000 lb. GCW, powered by gasoline or diesel engines. The B Series is entirely new in design and engineering from tall fender to front bumper to meet and anticipate the most modern operating requirements. Typical of the advantages claimed for the B Series Macks is that of highest possible payload capacity, both of volume and weight, within legal limitations. This has been achieved through a reduction in chassis weight without any sacrifice of traditional Mack strength and stamina and through a new, more compact chassis design. Frames are



Model B42T Highway Tractor

strong and stiff but, because they are fabricated from lighter steel alloys than previously, they weigh considerably less. Axle housings, transmission cases, and wheels all embody similar weight-reducing constructions which in turn is passed along to the operator in additional payload weight capacity. The B Series has a short hood, bumper and radiator with the engine mounted well over the front axle, thus reducing the distance from front bumper to back of cab. This design when applied to tractors permits use of maximum length trailers within the 45 ft. overall length limit and in a truck will accommodate commensurately larger bodies.

Vegetative Cover

(Continued from page 89)

but if used at high rates of seeding may injure the permanent stand.

"Nurse crops" are more properly termed "Companion crops," but are truly "Competitor crops" and interfere with the rapid establishment of desirable perennial grasses.—Morrish.

Seeding Method

24. The method of seeding was of less importance than the time of seeding and the soil fertility, seed

coverage and moisture conditions on the projects studied.

25. A seeding method which places the seed in the soil to a depth of from $\frac{1}{4}$ in. to $\frac{1}{2}$ in. is desirable.

Good results have been obtained by the use of a rotary tiller which covered seeds from 1" to 2"—Garmhausen.

26. Seed coverage, with either soil or light mulch, gives better results in most cases than surface and uncovered seedings. Seeding on existing open or temporary vegetation without working the soil has given good results.

Time of Seeding

27. Fall and early spring seedings give best results. Late spring and summer seedings are risky due to possible dry conditions, unless mulch is used.

Seeding may be done at all seasons of the year if a proper seed bed is established and a mulch is used.—Garmhausen.

Mulching

28. Mulch, when employed at a light rate on surface seeding, gives results equivalent to or better than many soil-covered seedings.

Mulching is a very vital step in the efficient establishment of cover on most sites.—Lamb.

Mulching may be dispensed with when seeding is performed during favorable seasons and where its erosion arresting properties are not required. Cultipacking to firm the soil, after seeding on soil fluffed by seed bed preparation, would then result in quicker and more uniform germination and would be less expensive than mulching, except possibly on steep slopes.—Hunter.

29. Anchoring of mulch is not necessary except where light and loose material is used and on steep slopes and exposed areas.

Hay and straw mulch must generally be anchored to prevent loss by wind or air disturbance by traffic.—Hunter, Morrish.

Maintenance

30. The fertility level of the soil must remain high enough to maintain a vegetative cover. The appearance of the vegetation is an indicator of possible need of fertilizer. When that need is indicated, fertilizer must be applied in amounts sufficient to supply the deficiency but not enough to cause heavy top growth.

Grasses for roadside cover generally should be maintained under minimum nutrient requirements to reduce mowing required to the minimum. Mowing will be proportional to plant food levels when moisture is not a limiting factor.—Tyson.

31. Except where required for safety, snow drift control, or appearance considerations, slopes should not be mowed, thereby permitting a natural development of indigenous woody plants.

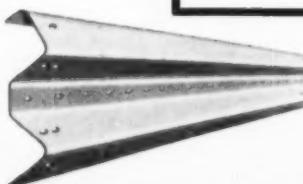
Selective thinning of volunteer growth may be required where mowing is eliminated.—Wright.

Continental Steel Promotes Two. Promotion of two men in its sales department has been announced by Continental Steel Corporation, Kokomo, Ind. L. B. Alley succeeds F. A. Lewis as sales manager of Chain Link and Ornamental Fence Division. Mr. Lewis was recently promoted to the position of sales manager of the Merchant Trade Division of the company. Jack E. Elliott succeeds L. B. Alley as assistant sales manager of the Chain Link and Ornamental Fence Division.



You can afford the extra safety of USF Barrier-Beam Guard Rail. It erects so quickly . . . requires no spring bumpers . . . no post guying . . . no anchors . . . that installed costs are lower than you expect. Routine maintenance is minimized and even damage is generally limited to a single length. Consider these factors and you'll agree . . . you can afford USF Barrier-Beam Guard Rail everywhere.

- High beam strength deflects vehicles
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- Mounts directly to posts . . . no extra rigging.
- Rounded "Safety-Top" saves lives



Get Exclusive
"SAFETY TOP"
at
No Extra Cost!



New rubber mounted 4-wheel drive tractor

Another new tractor with front end loader is on the market. The Power horse 40 rubber tired tractor manufactured by



Power Horse 40 with hydraulically operated front end loader

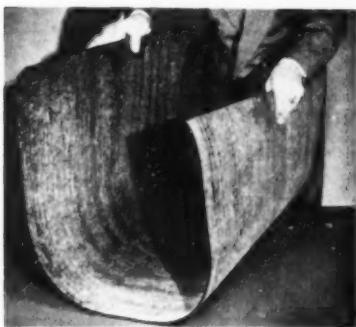
the National Implement Co. is also provided with facilities for attaching a bulldozer blade and a boom hook. The company announces many dealership areas to be open. The tractor drives on all four wheels.

Dump Truck Bodies Made of High Tensile Steel

The Gallon Allsteel Body Co., Galion, O., has announced that it will employ high tensile steel exclusively in the construction of its complete line of dump truck bodies, ranging in capacities from 3 to 27 tons. It is claimed that use of this material will make possible over-all weight savings up to 25%, and thus will greatly increase payload capacities by cutting down dead-weight of vehicle bodies.

Glass Fiber Mat for Lining Canals

A new product, Duramat, has been added to the line of Glass Fibers, Inc., manufacturers of Microlite glass fiber insulating



Duramat Glass Fiber Mat

wool. Made from glass fiber mat reinforced with parallel strands of glass yarn, Duramat is coated with special waterproof asphaltic materials. The reinforced glass fiber mat is stated to give Duramat added strength and to make it even more tear and puncture resistant. It is very flexible, bends around curved or irregular surfaces without difficulty and conforms readily to ground contour. It will not rot or deteriorate. Among the uses for Duramat is lining irrigation ditches, laterals, canals, reservoirs, and swimming pools.

WORKS BOTH ENDS ON BIG STEEL MILL PROJECT...



Get it done . . . and fast! That's the "word" at the site of U. S. Steel Company's new Fairless Works. And that's the reason James Armour Excavating Company is using two MICHIGAN Truck Cranes to handle and distribute materials at this huge steel mill project.

Here's just one example cited by operator Randall Auer: One of the MICHIGANS transferred pipe from a freight car to a truck, then followed the truck to a spot half-a-mile away where it unloaded the pipe. It then accompanied the empty truck back to the car for another load. The process was repeated until all the pipe had been removed from the car. Only MICHIGAN'S speed and mobility made it possible to work both ends of this job with one crane.

When you need an excavator-crane that has everything you want plus speed and mobility, investigate MICHIGAN . . . most complete line of $\frac{3}{4}$ -yard and $\frac{1}{2}$ -yard excavator-cranes available. Write for full details.



MICHIGAN POWER SHOVEL COMPANY
480 Second Street, Benton Harbor, Michigan, U.S.A.

Current Trade Literature

Listed below are brief notes on bulletins, booklets, catalogs, brochures and circulars of particular interest to contractors and engineers. This current trade literature is yours for the asking. Just describe desired items on the Readers Service Card and mail. We will do the rest.

CONSTRUCTION AND MAINTENANCE EQUIPMENT: W. E. Grace Mfg. Co., 60 11th Ave., N.E., Minneapolis, Minn. 46-page folder of catalogs and circulars on Grace construction and maintenance equipment. Illustrated and described are: Rapidspay maintenance distributors, road sweepers, engine driven or front tractor, road blowers, heaters for asphalt tanks, asphalt pumps and pumping units, spreaders, pneumatic rollers, sheepfoot rollers, drag brooms and concrete carts.

ROCK DRILLING EQUIPMENT: Inggersoll-Rand, 11 Broadway, New York 4, N.Y. 40-page catalog illustrating and describing compressors, rock drills and air tools. Contains suggestions as to how compressors and tools may be combined for the most efficient and economical operation.

TRAFFIC CONTROL: Eagle Signal Corp., 200 Twentieth St., Moline, Ill. 16-page bulletin describing a quick solution to progression problems. The procedure outlined offers a mathematical approach to the solution of time space diagrams with irregularly spaced intersections. It is stated this procedure offers a considerable saving in time over the trial and error graphical method of solving this type of problem.

DIAMOND BITS: Sprague & Henwood, Inc., W. Olive and Love Road, Scranton 2, Pa. 16-page bulletin (No. 320). Contains descriptions of several new types of diamond drill bits, one designed especially for faster drilling blast holes in hard rock. All are illustrated and tabulated. Bulletin also contains complete information regarding the diamond bits.

AIR ENTRAINING AGENT: Naval Stores Department, Hercules Powder Co., Delaware Trust Bldg., Wilmington, Del. 8-page booklet on Vinsol, air entraining agent. Describes factors influencing air entrainment of concrete, and tells how Vinsol is used and the results obtained from its use.

V-TYPE SNOW PLOWS: Frink Snowplows, Inc., Clayton, 1000 Islands, N.Y. 24-page catalog on Frink V-type snow plows and leveling wings for motor trucks. Special features are illustrated and described. Descriptions, pictures and specifications are included for 11 models. A section is devoted to the "selective" power hydraulic control, an exclusive Frink feature.

WIRE ROPE RECOMMENDATIONS: American Cable Division, American Chain & Cable Co., Inc., 729 Connecticut Ave., Bridgeport, Conn. 16-page booklet designed with a definite purpose in mind—that of recommending the "one best wire rope" for each major type of equipment used by contractors.

MAINTENANCE TOOL: Templeton & Kelly Co., 1022 Central Ave., Chicago 44, Ill. 4-page catalog on Simplex Util-A-Tool. This tool has many uses, among them being pulling, pushing, clamping, holding for welding, pipe bending, lifting and wheel pulling.

CRANE, SHOVEL, TRENCH HOE: Sargent Engineering, Inc., Huntington Park, Calif. 6-page folder on model $\frac{1}{2}$ cu. yd. shovel, convertible to crane, dragline and trench-hoe. Tables are in-

cluded for crane and dragline lifting capacities and for trench-hoe operating ranges.

SIGN MANUAL: Lyle Signs, Inc., 2720 University Ave., S.E., Minneapolis 14, Minn. 44-page publication illustrating most of the signs characterized as National Standard signs and showing typical examples of each classification. Signs other than National Standards that have wide acceptance and have proved practical in actual service are also shown under proper classification.

JAW CRUSHERS: Diamond Iron Works, Inc., 1748 N. Second St., Minneapolis, Minn. 6-page bulletin contains facts and specifications on 11 sizes of Diamond Jaw crushers. Several useful charts are included.

DIESEL ENGINES: P & H Diesel Division, Harnischfeger Corporation, 4400 W. National Ave., Milwaukee 14, Wisc. 22-page booklet telling and illustrating the diesel story. Its main objective is to show just how simple the modern diesel is, and how easy it is to understand its operation.

POWER SHOVEL OPERATION: Koehring Co., 3026 W. Concordia Ave., Milwaukee 16, Wisc. 32-page booklet containing a series of eight articles giving a detailed discussion of the basic principles of power shovel and crane operation. Aligned by numerous photographs, drawings, graphs and tables, the capabilities of excavator and crane attachments are outlined and prescribed requirements given for most efficient operation.

PORTABLE GRAVEL PLANTS: Diamond Iron Works, Inc., 1748 N. Second St., Minneapolis, Minn. Bulletin giving specifications on the new 100 Series of three portable single pass gravel plants. Outstanding features are described.

ENGINEERING INSTRUMENTS: C. L. Berger & Son, Inc., 37 William St., Boston 13, Mass. 16-page catalog describing Berger engineering and surveying instruments. Included are sections on the general characteristics and optical systems of the instruments. Illustrated and described are 16 styles of instruments.

DIAMOND CORE DRILLING: Sprague & Henwood, Inc., W. Olive and Love Road, Scranton 2, Pa. 4-page bulletin illustrating and describing diamond bits and high-speed drilling machines.

CENTRIFUGAL PUMPS: Rice Pump & Machine Co., 1033 S. 40th St., Milwaukee 4, Wisc. 4-page bulletin on portable self priming centrifugal pumps, ranging in capacities from 7,000 G.P.H. to 40,000 G.P.H. Six models are illustrated and described and specifications given.

EARTH BORING MACHINES: Wyoming Valley Equipment Co., 1089 Wyoming Ave., Forty Fort, Pa. Literature on Sterling earth boring machines, extensively used on guard rail construction. The machines have hydraulic controls, hydraulic turntable and "fore and aft" mounting. Machines, by means of a hydraulic cylinder, can be extended or retracted horizontally for a distance of 28 in., thus allowing holes

the be centered 4 ft. from truck tires on side and 5 ft. from tires when extended to rear. Auger sizes ranging from 10 in. to 26 in. are standard; depths from 7½ ft. to 15 ft. are available.

DRAFTING MACHINES: V & E Manufacturing Co., 738 Fair Oaks Ave., Pasadena, Calif. 8-page bulletin on Vemco drafting machines. These machines combine in a single unit useful features of many pieces of older equipment: T-square (or parallel motion), horizontal straight edge, 45° triangle, 60° - 30° triangle, precision mechanical protractor, and scales.

TRAFFIC TIMING COMPUTATION: Eagle Signal Corp., 200 Twentieth St., Moline, Ill. 8-page bulletin of aids for more rapid traffic timing computation, containing charts in nomograph form. Basically with this type of chart and a straight edge, any one quantity can be determined if the other two are known.

LUBRICATION GUIDE: Swan-Finch Oil Corporation, 205 E. 42nd St., New York 17, N.Y. 16-page booklet containing useful information on the lubrication of tractors, trucks and road construction and maintenance equipment. Discusses Motul oils and greases. Tells what they are, their advantages, what they will do and how they should be used.

JAW CRUSHERS: Pioneer Engineering Works, 1515 Central Ave., Minneapolis, Minn. 24-page catalog designed to help in selecting the right size crusher for the job. Shows how Pioneer jaw crusher operates, how it is built and gives figures, dimension and details. Also shows accessories that help to make a crusher installation more efficient.

ASPHALT PLANT HEATERS: Hi-Way Machinery, Inc., 3697 Oakwood Ave., Youngstown 9, Ohio. 4-page catalog illustrating and describing two new models of hot oil heaters, particularly designed for smaller asphalt plants, tank car heating, light asphalt storage tanks and batch plants.

EXCAVATOR AND LOADER: Dempster Brothers, Inc., Knoxville 17, Tenn. 12-page catalog on the Dempster Digger a front end loader and excavating machine, featuring an exclusive crowd and hoist action claimed to enable the machine to dig out the hardest chert bank. Twenty-nine photographs show the machine in action on various construction jobs. Specifications for two types are included as well as descriptive matter on features of the machine.

ONE MAN CHAIN SAW: Homelite Corporation, Riverdale Ave., Port Chester, N.Y. 8-page booklet illustrating and describing the new Homelite one man chain saw. This saw weighs 27 lb. and has 4 HP engine. It is stated to cut an 18 in. pine in 16 seconds and an 18 in. oak in 28 seconds. It also is stated to handle trees 48 in. and more in diameter.

SOIL SAMPLING TOOLS: Acker Drill Co., Inc., 725 W. Lackawanna Ave., Scranton 3, Pa. 12-page bulletin covering a complete line of soil sampling tools, diamond and shot core drills, drilling accessories and equipment.

LUBRICATION EQUIPMENT: The Graco Co., Inc., 60 Eleventh Ave., N.E., Minneapolis, Minn. 24-page catalog specially prepared for truck, bus and fleet operators. Places special emphasis on modern layout of fleet lubrication department and points and advantages of adequate lubrication facilities.

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Prior to widening and resurfacing U.S. 90 near Del Rio, Texas, old 20-ft. roadway was unsafe for today's high-speed, high-tonnage traffic, although adequate in some respects for the medium volume of vehicles.



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Photos courtesy M. B. Hodges, District Engineer, Texas Highway Department, Del Rio

JULY, 1953

Published by Gillette Publishing Company
33 West Maple Street, Chicago 10, Illinois

When Should You Rehabilitate? When Reconstruct?
This City Patches Streets the Year Around
Trends in Use of Hot Mix Asphaltic Concrete.

GRADATION



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GRADATION UNITS



(Above)
The Model 863,
semi-trailer
mounted for
complete
portability.

(Left)
The Model 864,
tower type for
use where
portability is
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consideration.

for the 15-35 ton-per-hour
BARBER - GREENE
840 Bituminous Plant

Never before has gradation control—plus maximum portability and the established advantage of continuous mix—been combined in this capacity range.

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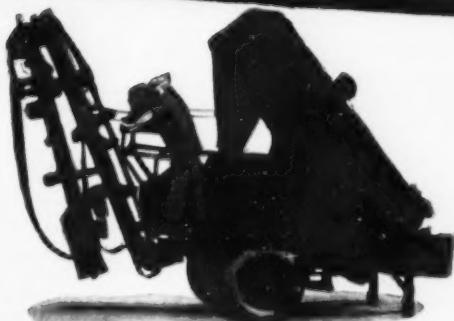
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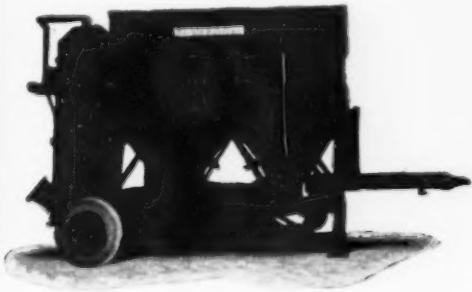
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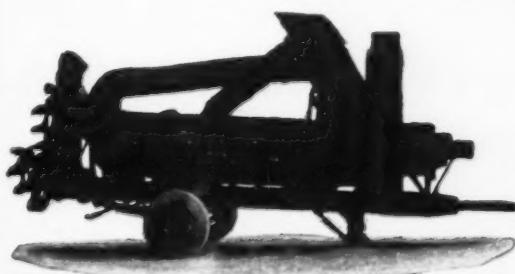


Model 843
Mixer



Model 863
Gradation
Control Unit

Model 839
Dryer



Barber-Greene

Aurora, Illinois, U.S.A.



GM DIESEL
CASE HISTORY No. 531-1

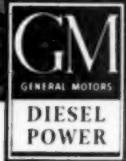
USER:
Van Doren & Stancil,
Richmond, Virginia

INSTALLATION:
GM 3-71 Diesel
replaced factory-installed
gasoline engine in $\frac{1}{4}$ -yard
shovel.

PERFORMANCE:
Owners report
10% increase in shovel
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Have ordered GM Diesel
replacement power in a
second shovel.



It pays to STANDARDIZE on



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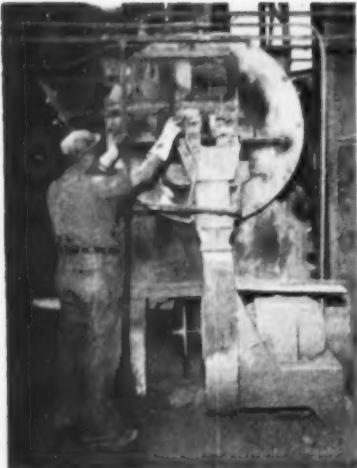


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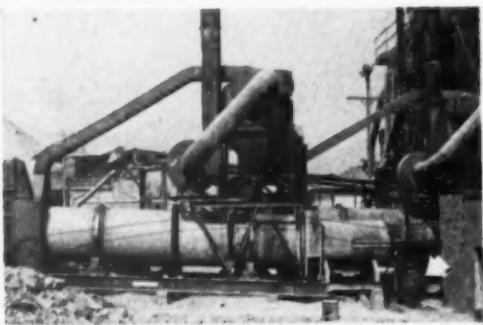
Hopkins Volcanic Oil Dryer Unit at Dunbar Slag Co.

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SLAG CO.
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Give us a DRIER HEAT...
Less Fuel Consumption"

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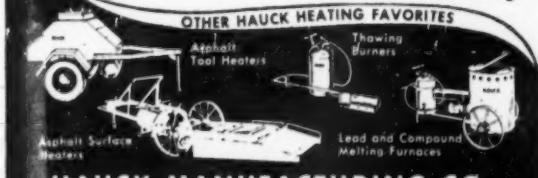
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• VIEWS AND COMMENTS

By H. G. Nevitt

Can Engineers Be Good Business Men?

We have always considered the informal definition of an engineer to be an individual who utilized the principles and methods of science to the benefit of mankind. It does not take much thought to see that this implies the application of economics to the engineer's work, so that the greatest results are obtained from the available human effort, for that in the end is what money represents.

Prominent engineers and educators have long recognized and stressed this need for attention to costs as part of the engineer's duties. Most engineering schools attempt to do this, and likewise develop interest in its corollary subjects, such as accounting. Likewise the matter of costs is continually appearing in engineering discussions. Yet many concerned with providing the funds for engineering work are inclined to wonder if those doing it, despite estimates, discussions of costs, and many other indications of proper attention to the economics involved, are at heart business men, with the point of view this implies, to the degree demanded by the public interest. Some remarks on the point might be of interest to those engaged in engineering work.

Point of View

The words "point of view" used in the preceding paragraph perhaps best bring out the concern of those providing the finances. They will see engineers carefully studying alternate approaches to a desired engineering end, then comparing the costs; they think that frequently the best use of the money procured should instead be the direct object, with the engineering to suit.

Anyone concerned with the utilization of fixed funds can attest to one marked engineering characteristic, the desire to build something completely new and technically far better and more satisfactory, rather than to get the most use out of what is presently available. This tendency has been one of the leading contributors toward the marked growth in engineering project costs in every line of work. The increases are far greater than the rise in unit costs for material and labor, and are in the face

of greater manufacturing and construction efficiency. As a result too many projects, in both industry and public work, are a monument to the builder's pride rather than his economic judgment.

Working with Inadequate Funds

Bernard Gray of the Asphalt Institute has been outstanding in emphasizing the need to carefully watch this tendency in highway construction. He is continually calling attention to the possibilities of handling the traffic load through salvage and improvement of existing highways as contrasted with super-highway construction, though without any denial of the need for these for certain types of traffic movement. This is an inescapable conclusion if the highway engineer and administrator will recognize that his function is primarily to see that the traffic moves satisfactory and economically, rather than to build highways. As Gray has frequently pointed out, the traffic needs can in many cases be taken care of by removing the bottlenecks on existing facilities instead of completely replacing the entire project. Limited addition of extra lanes in hills and curves, bypasses or additional traffic flow provisions at points of congestion will do the needed job in many instances as effectively as complete reconstruction.

It is well recognized that our road transportation facilities are in many cases obsolete and need eventual complete replacement; likewise that traffic demands of a new type are appearing as the result of progress and particularly of the impact on our whole manner of living from the advent of the automobile. Much rebuilding and entirely new work must be done for the present or (more frequently) the near but not clearly foreseeable future.

Yet our finances are extremely limited as compared to the need. A business man takes care to utilize his present facilities to the utmost through wise repair and minor adaptation until he has both the money and a clear idea of his future needs before he puts his capital in improvements; the highway engineer can display the same prudent judgment. Is he doing it as much as he should?

Rehabilitation—or New Construction?

This author describes an example of design approach aimed at making better use of existing facilities, at a saving over entire reconstruction on a new line. By prescribing widening, culvert lengthening, easing of curves, cutting down of summits, and minor re-grading, an old roadbed was salvaged and the traveling public given a stronger, higher speed road for today's traffic.

By M. B. Hodges

District Engineer
Texas Highway Department
District 22, Del Rio

IN Texas, and especially in the western part, we have many hundreds of miles of highways constructed 20 or more years ago which have become somewhat obsolete under fast motor cars and heavy trucks. The highways are adequate in most instances for their traffic volumes, but were designed for speeds up to 45 mph. and pay-loads of 7,000 lb.

Within the relatively short lifetime of these roads, however, the picture has altered not only in Texas but throughout the Nation. Motorists are demanding highways for greater speeds and increased safety and the highways must be constructed for the ever increasing demand for heavier loads. Otherwise, maintenance costs become excessive in an attempt to maintain what we have in reasonably good condition.

A typical section of such a highway existed prior to 1953 on U. S. 90 from a short distance west of Uvalde to the Uvalde-Kinney County line. This highway spanning Texas from Orange to Van Horn is a particularly important tourist route. The section under discussion was designed by the author in 1925 and constructed under the supervision of D. W. Hooper, who at present is a Senior Resident Engineer at Seguin, Texas. A typical section of the completed roadway is shown in an accompanying sketch. In addition to the narrow crown, base and surface there were four rather sharp curves and many vertical sight distance restrictions. Note, also, that west of the Nueces River, topography is rather hilly and the formation largely solid rock. Multiple box culverts and bridges were 20 ft. in width between curbs and box culverts were 28 ft. between headwalls.

Two Fundamental Questions

When constructed, and for many years afterward, the highway was fully adequate for type and volume of traffic as well as for speeds.

With the advent of higher speeds from year to year and trucks carrying much heavier legal loads, this section of highway started to become inadequate during World War II and has been out-dated at a much more rapid rate since 1945. In discussing methods and means of improvement, two questions were paramount in addition to the costs involved for a relatively low volume of traffic.

Would the present as well as the anticipated traffic for many years hence justify the construction of a new highway more or less parallel to the existing one?

Or—could the existing facility be rehabilitated without too much difficulty and inconvenience to the drivers of some 1,200 vehicles per day?

This section of Texas is very sparsely inhabited and devoted to a major extent to ranching. The normal increase in population is small but there has been a definite increase in out-of-state traffic.

Consideration was given to all possible features involved. There were several advantages in favor of rehabilitation and only one against. First, the cost per mile would be much less, not only for construction but for right-of-way costs. The old right-of-way was 100 ft. and we were planning an additional 20 ft. on either side. Second, we would be utilizing an existing roadway, in place for over 20 years and no doubt stable.

Of possibly minor consideration, and yet to be considered, was the question—if a new highway were constructed, would the existing one be completely removed? If so, this would increase the job cost materially; if not, the old road would be an eyesore to the motorist and a reminder of an expenditure of funds for a highway no longer of any value.

As far as we were able to determine the only disadvantages to the proposed rehabilitation were the inconvenience and delay to traffic during construction, and the resulting hazards due to blasting and the reluctance on the part of many motorists to slow down when passing through construction.

Pervading speeds in this area are



★ Finished base primed, tack coated half-width, limestone rock asphalt dumped on



★ Dumping the rock asphalt to measured positions designed to provide 75 lb. per sq. yd.

★ Here the limestone rock asphalt has been windrowed



relatively high due to light traffic volume and in most instances good-to-excellent highways. From past experiences we have realized that it is often difficult to secure the cooperation of motorists in reducing speeds, and there is the ever-present specter of an impending accident.

Decide to Modernize

After weighing the pros and cons on the balances it was decided that we would proceed on the basis of rehabilitation, or reconstruction. In order to secure a design speed of 70 mph. and a sight distance of 1,200 ft., it would be necessary to make three minor changes in location to

reduce curvature, and either provide a four-lane divided highway over several hills or make the necessary excavation to provide the sight distance required. Preliminary estimates indicated that the excavation would be the most economical; this solution also appeared to be the most satisfactory. The proposed project was incorporated in the 1952-53 Federal Aid Primary Program after approval by the State Highway Engineer and Commission.

Under the able direction of W. N. Blakeney, Senior Resident Engineer at Uvalde, plans were prepared with the intention of utilizing as much of the existing subgrade, base and surface as possible without disturbing

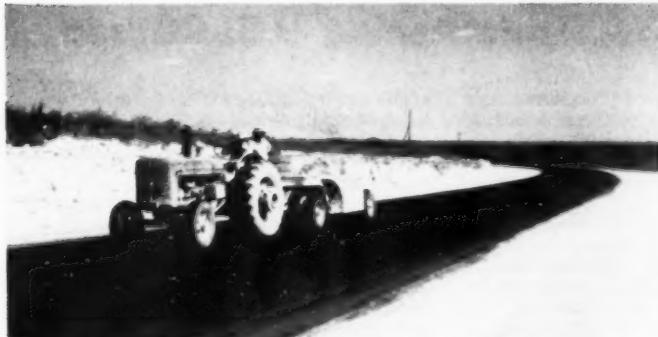
ance. The design features adopted are those for a primary two-lane highway with a crown width of 44 ft., a minimum structure length of 44 ft., a pavement width of 24 ft. and with stable 10 in. in depth, waterbound macadam type.

Due primarily to heavier truck loads we planned to provide a finished base, 15 in. depth compacted, using a processed caliche for all additional base material necessary. We used three caliche pits, all of which were within a short distance of the project and more or less equally spaced along the project.

In view of the nearness (5 or 6 miles) of two limestone rock asphalt



★ Blading the limestone rock asphalt with long-wheel base motor grader, which resulted in smooth riding surface



★ Pneumatic rolling follows blading—necessary for good compaction and riding quality. Two roller units often used



★ Final rolling with a 10-ton 3-wheel steel roller—done in a continuous operation after all preliminary work completed



★ "Before"—old road at typical multiple-box bridge, which was widened from 20 ft. to 44 ft.



★ "After"—new wide shoulders are continuous across the bridge, no longer a hazard



★ Example of shallow rock excavation done to reduce curve from 5 deg. to 2½ deg.



★ Dumping and blading first course of caliche on prepared subgrade adjacent to old pavement



Steps in Widening and Straightening U.S. 90 and

plants there was no question as to the type of the materials to be used for the pavement; this material has in our past experience provided an economical and very smooth riding surface. As a general rule some few settlements occur in a new base and for this reason we decided to use only 75 lb. per sq. yd. of limestone rock asphalt for the pavement. This amount gives a depth of approxi-

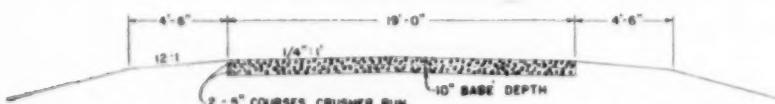
mately $\frac{1}{4}$ in. Such a procedure might be construed as stage construction, as later we can add additional material thereby leveling the existing surface and providing increased thickness.

Utilizing Old Base

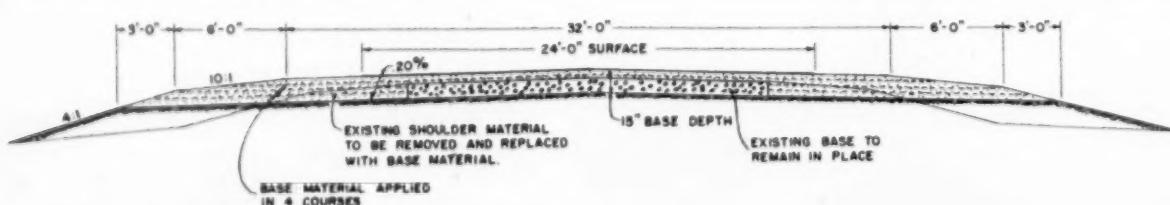
It might be interesting to understand the method which was used in utilizing the old base and surface. This was done over 52% of the

project. Special specifications were prepared for this item. The shoulder was bladed from one side of the pavement and the necessary grading operations were completed, after which a caliche base was placed in two courses to elevation of top of pavement. During this operation traffic was allowed on the old pavement as well as the opposite shoulder, which had not been disturbed. Upon completion of the caliche base on one side, the opposite side was treated in the same manner with traffic continuing to use the old pavement and the new caliche base.

By this procedure we secured a full crown width of base of approximately 10 in. compacted depth. We then



★ Cross-section of old roadbed, built in the 20's and 30's



★ Cross-section of the rehabilitated roadway, safe for modern traffic



★ Mobile compressor and wagon drill were used for blast hole drilling. (Right): Crushing and screening plant for caliche used in base



★ Scrapers were used for shallow excavation necessitated by a mile-long relocation. Another culvert being widened, from 22 ft. to 44 ft.—vital part of the U. S. 90 Texas modernization project



Building Up Base with Crushed Caliche

placed an additional 5 in. of caliche over the entire section including the old pavement, which resulted in a completed depth of 15 in. of excellent base. All other construction features were in accordance with Texas standard specifications.

Preliminary estimates after completion of the plans indicated a cost of \$580,235.20, including 10% for engineering and contingencies. The net length of the project was 16.529 miles and the program allocation was in the amount of \$630,000.00. Bids were received in Austin on March 19, 1952. Thomas and Ratliff of Rogers, Texas, were the low bidders, at \$415,167.52. Construction was started April 7, 1952, and the project was completed on January 26, 1953.

50% Saving Indicated

The final cost of the project, including both preliminary and construction engineering, was \$479,689.31, or \$29,021.07 per mile. Including costs to Uvalde County for a new right-of-way and damages, it is doubtful that a new highway constructed under a similar design could have been secured at twice the above figure.

Under the procedure traffic suffered some inconvenience for about ten months, and a few complaints were heard from motorists who always seem to be in a hurry to reach their destination with nothing to do after they arrive. No accidents occurred, for which all of us were quite thankful.

From our experience with the project, it is our belief that highway engineers should give much thought to rehabilitation of an existing highway on relatively low traffic count roads, before condemning the procedure we used and constructing a new one adjacent and parallel to the old one. Sometimes we wonder what is in the mind of the taxpayer when he sees the latter condition. In the final analysis John Q. Public is our "Big Boss"—he is the one who pays the taxes and from which we secure the funds for the construction and maintenance of our highway system. We feel sure that Mr. John Q. appreciates any conservation of his monies, especially when he secures an adequate facility at a appreciable saving even though he may lose a few minutes time on a trip.

Rubber compound given first try on New Jersey resurface job

New Jersey's first test of a rubber compound for pavement resurfacing was made in May of this year. A 4.5-mile section of Route 43 near Ellwood, N. J., was given an over-lay using a combination of asphalt and Surfa-Sealz, a plasticized synthetic rubber compound made by Naugatuck Chemical Division, U. S. Rubber Company.

The compound was applied over a 1½-in. layer of binder material, laid directly on the existing 29 year old concrete. The contractor, Ole Hansen & Sons, received the compound shipped hot from the Chemical company to their asphalt plant by 3,000-gallon insulated tank truck.

The rubber is said to act as a binder for the asphalt, preventing water from seeping through and contributing to roadbed deterioration. Advantages of greater durability, better riding quality and increased safety are claimed by the compound's suppliers.

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This photograph shows the green walks on
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City Starts All-Weather Street Maintenance

THE City of Anderson, Indiana has a large mileage of paved streets and, as is always the case, these streets require maintenance.

The Street Department has carried out a consistent patching program during the summer months, but it has become increasingly evident that patching should be carried out on a year-round basis. Pavement cuts, breaks or chuck holes appearing in the fall, winter or spring should be patched immediately, it was noted; this prompt patching reduces the total tonnage of patching required to keep the streets in good repair, and at the same time the streets are kept in good condition at all seasons of the year.

After arriving at a general plan, the city purchased a McConaughay HTD Model B patching mixer and started patching the next day after a snow storm. In fact some snow was falling on the first day the new unit was in operation and the holes contained snow and ice. However, the holes were there and needed attention.

The bituminous material selected for use was Emulsified Asphalt AE-150. This is a material requiring no heating for removal from the drum even in cold weather.

The aggregate used was a gravel-sand mixture with good stability characteristics and was similar to that used for a fine-aggregate type asphaltic concrete.

Between 10 and 12 per cent of asphalt emulsion by weight of the aggregate was used in the patching mixture.

The mixer was attached to a truck as shown in the accompanying pictures and moved down the street as the patching was done. Three cubic foot batches of graded aggregate were shoveled into the bin of the mixer, and the emulsion was poured over the aggregate in the bin. These materials were discharged into the mixer for heating to a temperature of 250° F. to 300° F. After heating, the mixture was discharged onto the shoveling apron and from there was shoveled into the patches for leveling and compacting.

These repairs have turned out to be sound and tough.

The HTD mixer produces a satisfactory quantity of material for this maintenance operation. The low cost of the equipment and the success of the patching programs recommend this machine for all-weather maintenance of streets.

Oscar Nelson is street superintendent of Anderson.



★ Patching in the snow at Anderson, using an emulsion and a McConaughay patching mixer

Off-center laning planned on N. J. Route 9

Special emergency traffic control on Route U. S. 9 in the North-Jersey Metropolitan area will be instituted again this summer by the State Highway Department and State Police on weekends and holidays. The critical area is adjacent to bridges over the Raritan River.

Under the plan three lanes of the four-lane-divided highway will be used each weekend in the direction of the greatest traffic flow. To make this possible, it will be necessary to run one lane of traffic on the left-hand side of the center island.

Traffic will be directed by the State Police and safety devices, including signs, flares, traffic cones, and flags will be supplied and set up by State Highway Department forces.

On summer weekends and holidays traffic to and from the Shore cities has totalled as much as 55,000 cars in one direction at this location, where Routes U. S. 9, 34, 35 and 36 converge.

• John E. Davidson has become executive vice-president of Massman Construction Co., Kansas City, Mo. George E. Owens and Wm. H. O'Donley are announced as vice-presidents.

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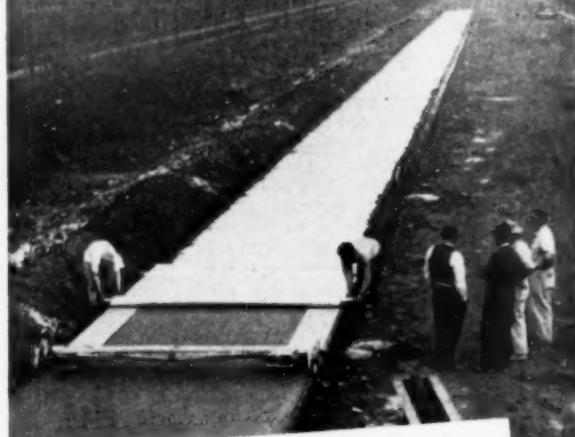
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Trends in Use of Hot-Mix Asphaltic Concrete

This article gives a perspective of the development of asphaltic concrete, and revises some of the design fundamentals. Beside new construction and resurfacing, it deals briefly with foundations and sub-bases.

By W. F. Winters

Chief Engineer The Asphalt Institute

ASPHALTIC concrete is a mixture of coarse and fine mineral aggregate, cemented together with an asphalt binder. This asphalt binder may range in penetration from 40 to as much as 300, but as customarily constructed today, over 50% of all asphalt cement employed is of the 85-100 penetration grade.

Asphaltic concrete was a development following the earlier use of sand-asphalt mixes, generally known as sheet asphalt. Sheet asphalt was first employed in the United States around 1870, and this type was used almost exclusively in city pavement construction for several decades thereafter. Around 1900, Mr. George Warren devised a mixture of coarse aggregate, sand, and asphalt cement, and the type was patented under the names of "Warrenite" and "Bitulithic." These mixtures were competently promoted by the excellent Warren Bros. engineering organization, and thousands of miles of highways and city streets were so constructed. Many of the earlier pavements are in use today after nearly 50 years of service.

The success of this type of mixture was so great that a number of attempts were made to provide similar mixtures without infringement on the Warren patents. The essential feature of the patent was that the coarse aggregate, which constituted 50% or more of the total weight of the mixture, provided an interlocking bond so that the compacted mix had high structural strength in resistance to heavy loading, both static and moving. In the famous trial at Topeka, Kansas, the Warren patent was definitely established as covering aggregate mixtures which were composed of 50% or more aggregate retained on the No. 10 sieve, while a mix containing a lesser amount did not infringe upon this patent. As a result, a finer graded combination was developed and widely promoted under the name of the "Topeka Mix" in competitive design.

With the expiration of the Warren Bros. patents, all varieties of coarse aggregate mixtures came into the public domain, and their use, both in street and highway paving, increased rapidly thereafter. The so-called Warrenite mixtures are now classified by other terms in the open specifications used by states, cities, local and federal governments, while the Asphalt Institute has standardized these mixtures under the title of Specifications A-2-a and A-2-b. The so-called "Topeka Mix" is now generally known as stone-filled sheet asphalt, provided for in the Asphalt Institute's Specifications under the designation Specification A-3; while the standard sheet asphalt mixture is known as Specification A-4.

Advantage of Stability

The essential difference between sheet asphalt types and asphaltic concrete is the fact that in the latter, 50% or more of the aggregate is coarser than a 10-mesh sieve. The greater advantage of asphaltic concrete is the high stability which can be secured from the use of these coarser aggregates, which may be of a great variety of materials, such as gravel, slag, and crushed stone. Many

Presented before the 51st Annual Meeting of American Road Builders' Association February 11, 1953, Boston, Mass.

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aggregates which might be unsound in rigid types of construction are entirely suitable for asphaltic concrete, because they are coated with a waterproofing material which is capable of being materially expanded in volume without rupture. Moreover, incipient cracking, which may take place under extreme cold-weather conditions, tends to be repaired by the slow flow of the asphalt binder during the subsequent warm-weather period.

The early construction of asphaltic concrete was carried on in practically the same fashion as with the sand-asphalt mixtures. The materials were blended in a plant, the mixer box—commonly known as a pugmill—containing blades set in one or more horizontal shafts. As the blades revolved, the mineral aggregate and asphalt cement were blended. For many years, mixtures, after being hauled to point of use, were spread by hand-shoveling and hand-raking.

With hot-laid mixtures, allowance needed to be made for the time interval between deposition, raking, and compaction. Strict specifications provided that the hot mixture be deposited upon a wooden platform steel plate from which it was shoveled to the place of use, so that the entire load would be turned over, thereby providing a uniform density. Much hand labor was therefore required to re-deposit the mixture, a shovelful at a time, and considerable expertise also was required in the raking operations, to the end that a uniform layer was achieved and a smooth riding surface was available after rolling.

Mechanical Spreading Developed

In the early thirties, it became apparent that mechanical spreading was a necessity, and one of the first developments was in California under the direction of Mr. Pope, then Construction Engineer for the California Division of Highways, who took a concrete screed and added a rake bar operated by an eccentric, in an attempt to duplicate the effect of hand raking. Many miles of pavements were built by this machine, which operated on side forms in the same fashion as a portland cement concrete finisher. The Jaeger Machine Company was an early marketer of this type spreader known as the Lakewood Finisher. This unit, too, operated on side forms and was built in widths up to 30 feet.

Concurrently with these developments, two other companies experimented with mechanical finishing, the Barber-Greene Company and the Foote Manufacturing Company. These companies and several others market finishers today. *In every case the machines are operated without the use of side forms.*

It would be hard to over-emphasize the influence of these mechanical

spreaders and finishers. They take the place of many skilled workers and provide for surfacing operations in such a way, either in new construction or in the resurfacing of old pavements, that paving can be done on one-half of a road while the other half remains open to traffic.

One great advantage of mechanical spreading is the fact that thin multiple layers can be placed, the vertical joint between each succeeding layer being offset, so that the finished pavement is a completely homogeneous structure throughout its entire width. Moreover, it permits uniform resurfacing of old pavements that have a high crown by placement first of a wedge course; thus irregularities in an old foundation can be smoothed out completely and the final pavement constructed to modern close tolerances. Almost every present-day specification for hot-laid mixtures limits the smoothness to not more than $\frac{1}{8}$ inch variation in 10 feet, while for very accurate work this requirement may be for only $\frac{1}{16}$ inch in 16 feet.

Surface Texture Control

The texture of the finished pavement is controlled by the design of the mixture as well as the method of compaction. In general, for highway and street construction, rolling with a three-wheel roller and a tandem roller will produce the desired texture where appropriate design in respect to normal density has been provided. With the extensive use of asphaltic concrete for airfield pavements, parking areas, and other installations where spillage of fuel is a factor, greater density of the finished surface is required. This may be obtained readily by rolling with a rubber-tired roller between the first "breakdown" rolling, usually accomplished with a three-wheel roller, and the final smoothing with a tandem-type roller. One of the best rubber-tired rollers has a bank of rubber tires either on single or double axles. The platform is loaded to some 10 tons, and the roller is operated six to ten times over the surface. This type of rolling rapidly closes all surface voids, so that when smoothed with a tandem roller a completely dense finish is secured, one which is practically im-

mune to fuel spillage. Even old pavements can be greatly changed in surface density by such rubber-tire rolling if it is done during the warm weather.

The Need to Design Mixtures

With the great change in weight of traffic in recent years it becomes increasingly more important to design mixtures for the kind of loading to which they will be subjected. This means that careful laboratory studies should be made. Not only will there be more exact control of quality, but often there can be considerable economy effected by appropriate selection of the less expensive sizes of aggregate. Four principal methods of design are in common use, and each one of them, if correctly followed, will give the information required to obtain economical and durable mixes. These are the Hubbard-Field method, the Triaxial Shear method, the Hveem method, and the Marshall method.

The Hubbard-Field method for asphaltic concrete, which was developed from the original Hubbard-Field stability test for sheet asphalt mixtures, uses a 6-inch diameter mold, which was designed to take care of the coarser size aggregates used in asphaltic concrete. This method is fully described in the Asphalt Institute "Manual on Hot-Mix Asphaltic Concrete Paving" and so will not be discussed in further detail in this paper.

The Triaxial method also is described in detail in the Institute "Manual on Hot-Mix Asphaltic Concrete Paving." Essentially it is a method of measuring the qualities of asphaltic concrete in respect to cohesion and internal friction; and from an appropriate chart showing these values in relation to one another it is possible to designate clearly satisfactory mixtures.

The Hveem method also employs appraisal of the internal friction and cohesion properties of mixtures and is the designed procedure followed in California and a number of western states. It is fully described in Special Technical Publication No. 106, published in October 1951 by the American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pa.

How Local Aggregates of Widely Varying Gradation Have Been Used on Recent Projects

| Sieve Sizes Passing | Maine Turnpike | | New Jersey Turnpike | | Turner Turnpike | |
|---------------------------|-------------------|---------|------------------------|---------|--------------------|---------|
| | Base | Surface | Base | Surface | Base | Surface |
| 2" | 100.0 | | | | | |
| 1½" | 97.4 | | | | | |
| 1" | | 100.0 | 100.0 | | | |
| ¾" | 73.1 | 93.1 | 86.0 | 100.0 | 87.0 | 100.0 |
| ½" | 53.1 | 66.1 | 60.0 | 70.0 | 63.0 | 87.0 |
| #4 | 41.0 | 52.7 | 38.0 | 46.0 | 48.0 | 67.0 |
| #10 | 32.4 | 43.0 | 29.0 | 32.0 | 39.0 | 48.0 |
| #40 | 16.8 | 26.0 | 18.0 | 16.0 | 27.0 | 31.0 |
| #80 | 9.9 | 15.7 | 9.0 | 9.0 | 15.0 | 15.0 |
| #200 | 5.5 | 5.7 | 3.0 | 4.0 | 7.0 | 7.0 |

and also may be obtained directly by writing to the California Division of Highways.

The Marshall method is the one adopted by the U. S. Corps of Engineers after a great amount of experimental work by this body. Its advantage is not only the simplicity of the testing equipment but also its ready portability because of compactness and small size. The method is fully described in a manual on "The Marshall Method for the Design and Control of Bituminous Paving Mixtures," and copies may be secured by writing to the Marshall Consulting and Testing Laboratory, 1127 Fairmont Avenue, Jackson 17, Mississippi.

While asphaltic concrete may be made a completely rigid pavement, this is undesirable, and consequently not only the stability but also the flow properties of any mixture should be evaluated. This quality of flow is evaluated somewhat differently in the several methods of design but may be sufficiently appraised in each procedure. Perhaps the desired quality may be best described by saying that consistent with *minimum* stability requirements for any given traffic conditions the *maximum* amount of asphalt binder should be employed, as this will provide for optimum flow characteristics and maximum durability of the pavement under conditions of use.

The design of any asphalt mixture varies with the location of the work and the character of the aggregate available. There is no absolute gradation curve for asphalt any more than there is for other types of concrete, and it cannot be too strongly emphasized that careful appraisal of the properties of the particular aggregate should be made and the gradation then adopted in light of such study. The nearby aggregates can thus be adapted fully for construction use, and variations between aggregate sizes, all equally satisfactory, can be used as shown on several principal projects, including the Maine Turnpike, the New Jersey Turnpike, and the Turner Turnpike in Oklahoma.

On Old Work and New

Asphaltic concrete is employed widely both in construction of entirely new pavements and in the rehabilitation of old pavements of all types, either by resurfacing alone or by a combination of widening and resurfacing. Through use of the mechanical spreader, levelling courses are readily applied so that even the most irregular surface may be smoothed, preparatory to placement of a new course which will conform in profile and cross-section to modern requirements.

In the building of new asphaltic concrete pavements, or, in fact, in the building of any highway, the importance of the development of the relatively new science of soil

(Continued on page 118)

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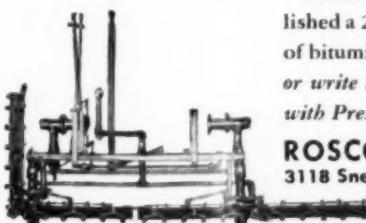


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front wheel drive to best fit your needs. Your Hough Distributor, one of 200 in the U.S. and Canada, is ready to serve you right — with extensive application experience and complete parts and service facilities. The Frank G. Hough Co., 768 Sunnyside Ave., Libertyville, Ill.

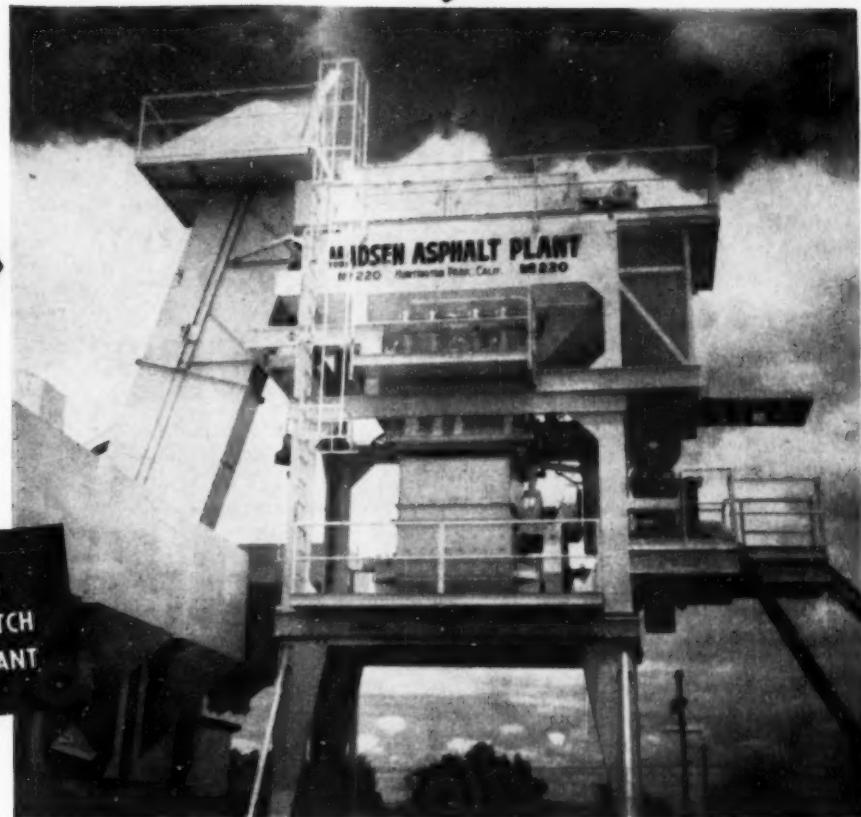
WRITE for full information on any of the "PAYLOADER" models: Four Wheel Drive HM — 1½ yd. and HR — 1 yd.; Rear Wheel Drive Models HY — 1¼ yd., HF — ¾ yd., HE — ½ yd.; Front wheel drive Models HAH — 15 cu. ft., HA — 12 cu. ft.



PAYLOADER®
THE FRANK G. HOUGH CO. SINCE 1920

A large, stylized logo for "PAYLOADER" is centered. To the left is a circular emblem containing a stylized letter "H" with the words "SAY 'HOUGH'" underneath. To the right is a small illustration of a tractor. Below the main text, "SINCE 1920" is written in a smaller font.

MADSEN LEADS in California!



Equipment that Serves ®

There are more MADSEN Asphalt Plants in California than any other make...and there have been more MADSEN Plants sold in California in the past two years than all other makes combined!

You buy an asphalt plant to make money... and MADSEN'S superior engineering, sound basic design and outstanding features have

shown contractors again and again that they can make more money when they operate a MADSEN Asphalt Plant. That's why MADSEN leads the field in the state that leads all others in the number of asphalt plants. Remember MADSEN, when you are in the market for a money-making asphalt plant.

Write for complete details on the new MADSEN 4000-lb. Batch Capacity Asphalt Plant...the plant that gives you reduced cost-per-ton for every ton produced.

ESTABLISHED 1910... THE OLDEST
MANUFACTURER OF ASPHALT
PAVING PLANTS IN THE WEST

MADSEN IRON WORKS, INC.
P. O. BOX 589 • HUNTINGTON PARK, CALIF.

Hot-Mix Asphaltic Concrete

(Continued from page 115)

Types of Construction, at 10-Year Intervals, Reported on the State Highway Systems

| | 1930 | 1940 | 1950 |
|--------------------------|--------|--------|--------|
| Graded and drained | 7,813 | 2,207 | 3,364 |
| Soil-surfaced and gravel | 15,306 | 7,133 | 17,564 |
| Low-type bituminous | 1,371 | 17,934 | 20,303 |
| High-type bituminous | 1,973 | 3,335 | 12,876 |
| Portland cement concrete | 8,651 | 1,632 | 1,380 |
| Miscellaneous pavements | 163 | 353 | — |
| Total | 35,277 | 32,594 | 55,487 |

(Advertisement)

STATES AND COUNTIES ARE SAVING TAX MONEY *By Salvaging Old Oil Macadams*

NORTH HOLLYWOOD, CALIF. — Reports from many sections of the country are revealing a practical way of making road and highway dollars go farther. By the simple expediency of re-claiming old or worn-out asphaltic oil mats or oil macadam, literally hundreds of thousands of dollars are being saved.

Until recently there has been no economical method of re-claiming these old mats. However, with the introduction of the Wood P-600

The savings are obvious. The expense of equipment and manpower for importing materials is completely eliminated, and aggregate costs are reduced to a fraction of the normal outlay.

The Wood P-600 Preparer also blends different types of soil with water for better sub-base compac-



Pulverizing old blacktop on a Montana county road.

A Wood Preparer pulverizing and blending 1½" to 2" asphalt with 2" of base material — in one pass.

Preparer, this problem has been completely whipped.

The Wood P-600 Preparer, in one operation, scarifies, pulverizes and prepares old asphaltic oil mats for 100% re-use. Even the old oil is retained. Nothing is lost. Aggregate is returned to its original size in one to three passes, ready for re-mixing and lay-down.

tion. It prepares cemented gravels, caliche, decomposed granites, clays and other hard soils for mixed-in-place road and airbase construction. Teamed with a Wood Roadmixer, this versatile tool is attracting the attention of road officials and contractors everywhere.

Complete information may be had from any Wood distributor, or by writing Wood Manufacturing Co., Box 620, 6900 Tujunga Ave., North Hollywood, California. Export Office, 3938 Wilshire Blvd., Los Angeles 5, California.

materials in the construction of the foundation so that only a relatively thin asphaltic surface is required to provide the necessary waterproofing and resistance to traffic abrasion.

There has been considerable discussion relative to the thickness of granular foundations provided on some of the new turnpikes and it is clearly evident that a misunderstanding exists concerning the cost of such improvement. Modern highways should be built as continuous embankments wherever possible, in order to provide necessary drainage and to lower permanently the ground-water level. Moreover, snow removal is materially facilitated by such a cross-section, because an elevated profile tends to clear itself through wind action, thereby reducing this expensive maintenance item. With such an embankment section, it is often necessary to obtain borrow material in order to balance out. The question then arises as to whether a carefully selected and carefully compacted borrow costs substantially more than would be the case as contrasted with unclassified excavation. The record, therefore, in this regard is of interest.

On the Oklahoma Turnpike it was found that the selected borrow actually was cheaper to employ than unclassified excavation. On the New Jersey Turnpike the cost for the selected borrow was approximately 16¢ per cu. yd. more than unclassified excavation. In many instances, of course, the unclassified excavation itself may be suitable for selected sub-grade construction, but even where it is all taken from selected borrow pits, the increased cost is nominal while the resulting improved foundation support is greatly enhanced. It is evident, therefore, that to neglect to up-grade the soil foundation itself on all future highway and airfield work is to overlook the greatest opportunity for economy that modern engineering has provided.

This combination in the use of high-strength native aggregate materials for foundation—the improvement in mixing plants and finishing equipment, and utility for salvage of old pavements—has led to ever-increasing use of asphaltic concrete in paving operations. This is evidenced by comparing mileage constructed and reconstructed each year with previous periods. The preceding table of surface types, taken from "Highway Statistics," published by the Bureau of Public Roads, 1950 edition, is quite informative in this regard and indicates the extent to which these heavy-duty bituminous pavements have been adopted on the primary state highway system.

In conclusion it may be stated that the trend in design of modern asphaltic concrete pavements for both highways and airfields has been to provide more accurate control in design of mixtures and to use the particular methods of compaction which will provide the density and surface texture required for the given traffic

(Advertisement)

When writing advertisers please mention ROADS AND STREETS, July, 1953

condition. It is interesting to note further that in spite of the ever rising costs, improved equipment and improved techniques used in the placement of asphaltic materials have made it possible to construct them today, in 1953, at practically no increase in the price per ton in place as contrasted with 1933. It is this ever-advancing technological development that is the real answer to present paving needs.

Economic effects of Highway improvement

Bulletin 67, "Some Economic Effects of Highway Improvement," has been issued by the Highway Research Board. It includes two papers of related interest presented at the 32nd Annual Meeting.

The first paper, titled "Economic Evaluation of Two Indiana Bypasses," by A. K. Branham, A. D. May, Jr., and H. L. Michael, was developed from before-and-after studies conducted on two Indiana bypasses. The effects of the bypasses on traffic operation, accidents, land use, land value, and business have been analyzed and found largely beneficial.

The second paper, titled "Socio-Economic Relationships of Highway Travel of Residents of a Rural Area," by Lorin A. Thompson and Carl H. Madden, is a progress report of the effects of a new manufacturing plant upon the economic pattern of a rural county of declining population and low income.

Copies available on request to the Highway Research Board, 2101 Constitution Ave., Washington, D. C.

Bituminous tonnages up on New York state work

The tonnages of bituminous mixes of various types used in New York state continues to rise sharply, according to a report from Gus Raynor, Executive Secretary, New York State Bituminous Concrete Producers Association. Shipments were up 33 per cent in 1952 over 1951 and 91 per cent over 1950 on materials furnished by Association members to the state department of public works.

The following figures are for NYDPW shipments only, and do not include city, county, township and private shipments.

1950

| | |
|-------------------------------|---------|
| Special Projects | 222,103 |
| Maintenance | 138,261 |
| Construction & Reconstruction | 294,937 |
| Grand Total | 655,301 |

1951

| | |
|-------------------------------|---------|
| Special Projects | 297,923 |
| Maintenance | 115,028 |
| Construction & Reconstruction | 526,663 |
| Grand Total | 939,615 |

1952

| | |
|-------------------------------|-----------|
| Special Projects | 485,990 |
| Maintenance | 113,327 |
| Construction & Reconstruction | 652,849 |
| Grand Total | 1,252,165 |

SUMMARY FOR THE YEAR 1952

| | Special Projects | Maintenance | Construction Reconstruction | Grand Totals |
|---------------|------------------|-------------|-----------------------------|--------------|
| Type 1A | 146,215 | 10,869 | 315,269 | 472,353 |
| Type 2A | | | 41,871 | 41,871 |
| Type 3A | 12,470 | 19,694 | 5,258 | 37,422 |
| Type 4A | | | | |
| Type 5A | 12,166 | 1,316 | 17,905 | 31,387 |
| Steammix | 308,592 | 57,346 | 263,244 | 629,182 |
| Colprovia | 6,547 | 250 | | 6,797 |
| Warcolite | | 595 | | 595 |
| Wintermix | | 23,256 | 57 | 23,313 |
| Sheet Asphalt | | | 9,245 | 9,245 |
| Grand Totals | 485,990 | 113,327 | 652,849 | 1,252,165 |



STANDARD STEEL "S-J" for PATCHING - PRIME COAT - SEALING - SHOULDER REPAIR and CRACK FILLING

Built to *The Highest*
Standard

Compare These Special "S-J" Features:

- 1 SUCKS BACK surplus material into tank after spraybar is closed. Less drip! Means clean bar for next job!
- 2 PIPING and PUMP are automatically drained after finishing a job! This prevents "freezing" or slow start on heavy materials!
- 3 All OPERATIONS easily controlled by one operator riding the unit!
- 4 GRAVITY DRAW OFF ON CURB SIDE—means greater safety for operator!
- 5 ALL PARTS Readily Accessible for easy repair. Entire piping system can be taken down by unbolting only two circle flanges!

SAVES TIME and LABOR HANDLES ALL TYPES OF BITUMINOUS MATERIAL

★ For year round use—Standard Steel "S-J" Maintenance Distributor can be used either for emergency or secondary construction work.

The most adaptable piece of road equipment you can buy, the "S-J" performs many duties of heavier machines — such as building drives, alleys, playgrounds, parking areas, shoulders, reshaping curves as well as patching and sealing. Quick to start and get going, fast on the job, the low cost of this equipment will be paid for in reduced construction and maintenance cost in a single season. Get the facts and cost on the "S-J" before you invest in any similar equipment.

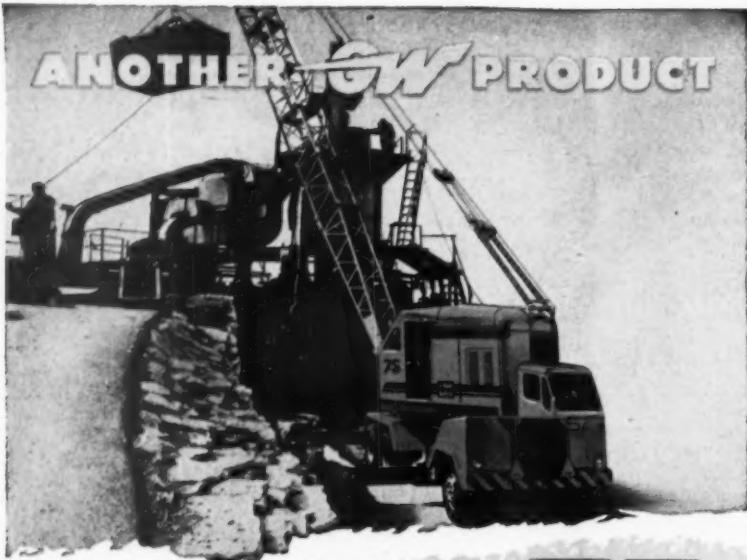
OTHER STANDARD STEEL PRODUCTS

Asphalt Pressure Distributors, Tar Ket-
tles, Patch Rollers, Supply Tanks, Tool
Heaters, Asphalt Tools, Street Flushers,
Construction Brooms and Aggregate
Spreaders.

WRITE FOR NEW
Catalog "S-J"

SJS

Standard Steel Works, NORTH KANSAS CITY, MO.



~~GarWood~~ 75

A Heavy-Duty Truck Crane that can Lift up to 20 Tons!

Gar Wood's 75BT truck crane gives you a specially designed, heavy-duty chassis for mobility and speed with full 40,000 lb. lifting capacity . . . Folding boom for easier handling in heavy traffic . . . High gantry, optional fluid coupling to absorb shock loads and power load lowering can't be beat for smooth, precision work! . . . Power actuated mechanical drum clutches, exclusive right angle drive, conical hook rollers and many other operating advantages for faster, easier work . . . The 75BT truck crane is quickly convertible to all attachments including the new, exclusive, profit-making Gar Wood Foundation Borer — the machine that bores and bails in one fast operation . . . Get details from your dealer—

TWO CRAWLER MOUNTED CRANES!

Standard-duty 75A and heavy-duty 75B models. With 35 ft. boom on 12 ft. radius a 75A lifts 16,500 lbs. and a 75B, 21,200 lbs. . . . Both are easily convertible in the field!



GAR WOOD INDUSTRIES, INC.
Findley Division • Executive Offices • Wayne, Michigan



Manufacturers' Literature

Your request on our post card insert (no stamp required) will bring you any of the publications here listed. Should you want other information, we will endeavor to get it for you.—*Roads and Streets*.

Advantages of Expandable Concrete Forms Described

An 8-page booklet describing the advantages of Rubora expandable concrete forms has been issued by Kurt Orban Co., Inc., 205 East 42nd St., New York 17, N. Y. These forms are constructed on a latticework principle that permits ready adaptation of panel size to a wide variety of dimensions. Developed in the Netherlands, Rubora has been extensively used in Europe to cut time and costs on cast-in-place concrete jobs. Basically, the construction consists of wooden struts which are latticed together and hinged at the intersection points. After adjustment at the job site to the desired panel dimensions, the Rubora form is covered with sisalkraft paper for rough finished work, or with a liner of $\frac{1}{4}$ in. composition board for a smooth finish. The paper or board is easily tacked into place on the form, and is stripped off after the concrete has set, leaving the form clean and ready for re-use.

How to Install Sewers by Tunneling

A new bulletin, issued by Armco Drainage & Metal Products Inc., Middletown, O., describes how tunneling is simplified by the use of Armco liner plates. A big problem in installing sewers and other underground structures is tearing up expensive pavements and disrupting traffic and business. The Armco bulletin tells how to avoid all that. The bulletin contains illustrations, including aggregate bins and conveyor tunnels, for which liner plates have been widely adapted; also a table of physical properties.

Meter for Measuring Air Content in Concrete

A 2-page circular has been issued by E. W. Zimmerman, 228 N. LaSalle St., Chicago 1, Ill., on the Acme air meter, a precision instrument for measurement of air contents in concrete. The meter is patterned after one developed by the Illinois State Highway Department in 1946, which is their standard equipment for the determination of air content in concrete. Designed for extreme accuracy, this meter is ruggedly constructed for field usage and has a capacity of 0.22 cu. ft.

Improved "Bondactor" for Placing Concrete

A 4-page brochure just off the press for Air Placement Equipment Co., 1011 West 24th St., Kansas City 8, Mo., fully describes and illustrates the improved Models No. 750 and No. 1250 "Bondactors." Methods are outlined and the principles of "air placed" concrete are explained. Application photographs show equipment in use on actual jobs. A long list of practical uses in the construction, repair and maintenance fields concludes this bulletin.

Clutches, Power Take-offs and Speed Reducers

The Rockford Clutch Division of Borg-Warner Corp., Rockford, Ill., has produced a new catalog of 56 pages, covering their clutches, power take-offs, and speed reduction units. Specifications and full descriptive matter are given. Detailed dimension drawings accompany the specifications. Large photographic illustrations are provided for each unit.

Explosives and Blasting Supplies

A 60-page catalog on Hercules explosives and blasting supplies has been issued by the Explosives Department, Hercules Powder Co., Wilmington, Del. Covered in the catalog are gelignite explosives, hercomite explosives, extra dynamites, gelatin extras, gelatins, blasting gelatin, seismograph explosives, oil well explosives, nitroglycerin dynamites, permissible explosives, blasting powders, pellet powders, blasting caps, electric blasting caps, delays, safety fuse, primacord, Bickford detonating fuses, and other blasting supplies. Each of these products is described and the best methods of using them detailed. It is a most comprehensive and useful catalog for every user of explosives.

Improved Principle in Pipe Cutting Explained

An improved principle in pipe cutting is described in a folder issued by Beaver Pipe Tools, Inc., Warren, O. The folder describes how Beaver's new No. 2 and No. 4 pipe cutters are constructed so that the cutting wheel is fed directly into the pipe. This allows easier, quicker cutting. Diagrams and drawings illustrate this point. The folder also includes size and price information. The back page is devoted to Beaver's new Model-D aluminum power drive. This new Beaver unit weighs about 10 lb. and is easily carried by one man.

Latest Developments in Fluorescent Street Lighting

A new booklet describing the latest developments in fluorescent street lighting has been announced by General Electric Co., Schenectady 5, N. Y. The well-illustrated, 8-page bulletin, GEC-963, describes installations of the newest light source in street-lighting systems, and includes a condensed history of fluorescent street lighting in the United States. It presents the advantages, applications, description, dimensions, electrical and photometric data, and construction features of the G-E Form 206 fluorescent luminaire.

Handy Decimal Equivalent Decal Offered Free

Engineers, designers, draftsmen, etc. may secure a convenient time saving decal showing decimal equivalents in 64ths, by writing to The Meyercord Co., 5323 W. Lake St., Chicago 44, Ill. The complimentary decal is only 6 in. by 1 1/4 in. and is designed for application to slide rules, T-squares, drawing boards, desk tops and other similar drawing equipment. The figures are easy to read, printed in sharp black and red type on a white background.

How to Select Roller Chain Drives

A new bulletin (No. 52-1) on Baldwin-Rex roller chains and sprockets has been published by Baldwin-Duckworth, division of Chain Belt Co., Dept. P. R., Springfield 2, Mass. The 54-page book describes the inherent advantages of roller chain and illustrates all the popular sizes of Baldwin-Rex roller chains. A section of the bulletin is a treatise on "how to select standard roller chain drives," with formulas, tables and examples illustrating this procedure.

New Brochure on Rock and Sand Dryers

A new, 4-page brochure (No. 5323) on rock and sand dryers has been used by the Standard Steel Corporation, 501 S. Boyle Ave., Los Angeles 58, Calif. It contains information on the rugged frame mounting, compact electric drive, and combustion chamber, and has close-up photos of the trunnion wheels and tire mounting. In addition, details are given on the latest Standard dust collectors and wet washing systems.



GarWood 75

A New 3/4 yd. Shovel with Many Exclusive Features!

Gar Wood has designed the new "75 series" shovels to combine many new and exclusive operating features with time-tested standards of advanced design and rugged construction . . . Both the standard-duty 75A and the heavy-duty 75B have *power actuated mechanical drum clutches, right angle drive, independent chain crowd, power steering, independent travel, conical back rollers* to eliminate rocking and an optional *hydraulic coupling* to absorb shock loads . . . Easy field conversion for crane, clam, dragline, magnet, pile driver or trench hoe work . . . Don't miss checking the profit potentials of the exclusive new Gar Wood Foundation Borer — the machine that bores and bails in one operation . . . See your dealer for details —

EASY CONVERSION IS A FEATURE



Your Gar Wood shovel can be quickly adapted for trench hoe work. Digs up to 17'10" depth, dumps at heights up to 19'3". Standard 40" dipper. 36", 31" and 26" widths optional.

GAR WOOD INDUSTRIES, INC.
Findlay Division • Executive Offices • Wayne, Michigan



RUEMELIN BLAST GENERATOR

FOR CLEANING BRIDGES—
WATER TOWERS—STRUCTURAL STEEL



Many contractors use Ruemelin Blast Generators for cleaning steel work to remove rust, paint and scale before repainting. These machines are also used to remove laitance from cement wherever concrete construction is in progress. A wet adapting nozzle can be furnished to convert dry machines to wet type of operation. Built in several sizes.

**Write for
Bulletin 36-C**

**RUEMELIN
MFG. CO.**

3990 N. Palmer St.
Milwaukee 12, Wis.

Manufacturers
and Engineers
**SAND BLAST AND
DUST COLLECTING
EQUIPMENT
WELDING FUME
COLLECTORS**

Five Caterpillar Diesel Electric Sets Described

A detailed description of five Caterpillar diesel electric sets is contained in a new booklet (Form 30507) published by Caterpillar Tractor Co. The booklet, with 50 illustrations, points up the ability, reliability, adaptability, durability, portability and economy of these five models: D17000, D13000, D8800, D318, D315 and D311. One of the features of this publication is two cutaway views of a D13000 diesel electric set on the two center pages which show the distinctive features built into these Caterpillar products. The booklet describes in detail the fuel, lubrication, and cooling systems of these units; points out the advantages of several of the important parts that go into these electric sets; contains descriptions of both self-regulated generators and the completely automatic standby electric sets; and describes the many attachments for these units.

Construction Uses of Baker-Lull Shoveloaders

New, two-color literature describing the construction and industrial uses of the Baker-Lull shovelloader has been issued by Baker-Lull Manufacturing Co., 314 W. 90th St., Minneapolis 20, Minn., Department KP. The literature illustrates applications and attachments for the front and loader, lists specifications of the equipment and describes performance characteristics.

Crushers for Reducing Fine Aggregate

A new catalog, No. 282, on Telsmith double roll crushers has been published by Smith Engineering Works. Made in three sizes, 24 x 16; 30 x 18; and 40 x 22, Telsmith roll crushers are offered for reducing large capacities of intermediate or fine aggregate at low reduction ratios.

Maintenance of Conveyor and Elevator Belting

A new 32-page manual on the installation and maintenance of conveyor and elevator belting has been published by the B. F. Goodrich Co. More than 60 photographs and drawings illustrate ways to improve belt service and to lengthen belt life. A chapter on how to select belts includes a discussion of belt design, covers, reinforcements and grades. There is a detailed review of the engineering information required to specify a new conveyor belt. Belt repair methods and belt splicing and fastening are covered in detail. The recently announced B. F. Goodrich Turnover conveyor belt system for handling wet, corrosive, sticky or freezing material is described in full. Developed especially for this manual is a table which lists common conveyor belt maintenance problems, the cause of each one, and the best remedy for the situation. Other topics covered in detail include ways to make conveyor belts run straight, the causes and effects of excessive tension, the selection of and installation of pulley lagging, ways to avoid belt wear at loading point, use of damage-preventing appliances, types of compensating idlers and the effects of defective idlers.

Five New Friction and Hydraulic Drives

To introduce five new friction and hydraulic drives for powered equipment used in the major industries, Twin Disc Clutch Co., Racine, Wis., has released a special 16-page "New Products" issue of Production Road, its house magazine. The new Twin Disc drives and the purpose of their development include a two-stage hydraulic torque converter, to fill the gap in industrial hydraulic drives; a new 2-speed transmission, to obtain extended full-range performance from three-stage torque converters; a new disconnecting hydraulic power take-off, to provide a higher capacity, more compact disconnecting fluid drive for powered equipment; a new air-actuated clutch, offering lighter weight and more narrow clutch width with higher torque capacity; and a new oil-actuated multiple plate clutch, incorporating an integral cylinder to eliminate adjustment and provide constant torque capacity, more compactness, longer wear life, and adaptability to remote control.

New Catalog Illustrates Wayne Crane

A new 8-page catalog illustrating in color the heavy-duty, self-propelled, wheel-mounted Wayne Crane Model 2 has been published by the Wayne Crane Division, American Steel Dredge Co., Inc., Fort Wayne, Ind. Entitled "Meet the Heavyweights," the descriptive catalog is the first in a series of new literature which will combine many on-the-job applications. Complete specifications, operating data and lifting capacities are included in the catalog.

"MEALORUB"

CRUDE NATURAL RUBBER IN CRUMBS

The only natural rubber powder that has proven its value in asphalt roads
in use for about fifteen years.

AVAILABLE FOR IMMEDIATE DELIVERY

For further information apply

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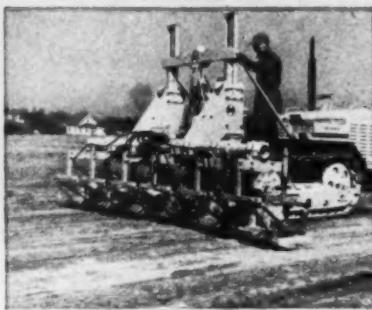
Representative for Indonesian Government Estates and The Indonesian Institute for Rubber Research

10 LEADS

TO BETTER
FASTER RESULTS



SOIL COMPACTION. The powerful, new, self-propelling JACKSON COMPACTOR, with 12" to 24" interchangeable hoses, achieves specified density of granular soils in 6" to 10" depths at 2400 sq. ft. per hr. Perfect for bridge and pipeline fills, concrete floor sub-bases, etc.



MACADAM DENSIFICATION. Multiple COMPACTOR units, up to 12 ft. wide and tailored to fit job, provide a faster, better means of macadam densification and consolidating sand-gravel-bituminous and other mixed-in-place combinations.



MUNICIPAL PAVING. This vibratory Screed strikes off to all crowns, undercuts at curb or sideform, works right up to and around obstructions. Only screed that can be rolled back for second passes on 4 rollers. Most productive and convenient screed made.

FOR SALE OR RENT
AT YOUR JACKSON DISTRIBUTOR

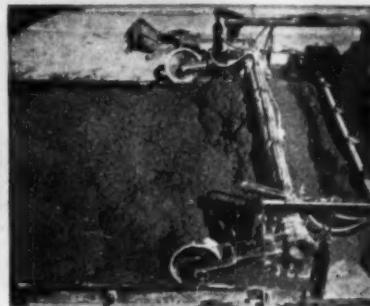
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LUDINGTON, MICHIGAN

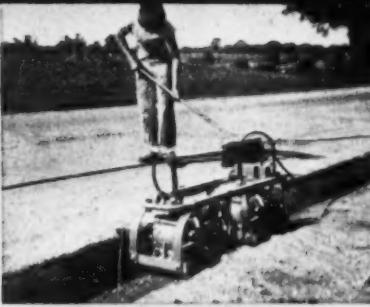
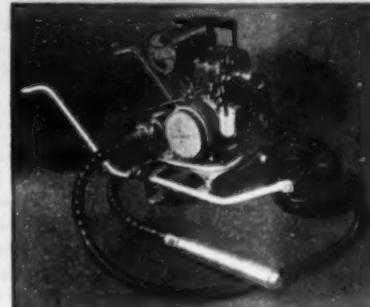
and BIGGER
PROFITS!



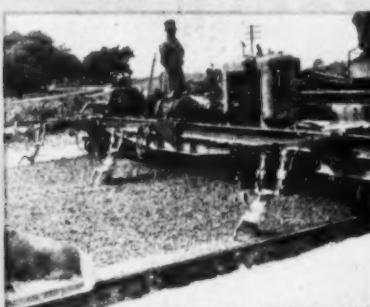
BLACKTOP WIDENING & PATCHING. The same machine, operated from power plant on auto-trailer with pickup for Compactor, is most efficient means of blacktop pavement widening and patching; paving walks, drives, etc. Compacts 2400 sq. ft. per hr. close to maximum density.



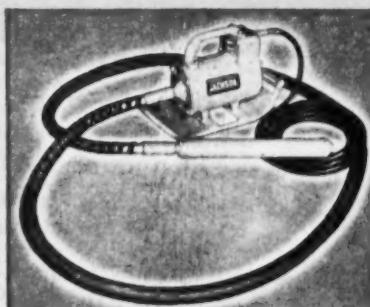
HIGHWAY & AIRPORT PAVING. New, super-powered JACKSON PAVING TUBE gives full width internal vibration through full depth of the slab. Saves time, cement; provides greater density and compressive strength. Attaches to standard finisher or spreader.



WIDENING STRIP SUB-BASES. Self-propelling tandem COMPACTOR (12" to 24" wide) will provide specified density in one pass. Controlled by spreader operator. No extra labor required.

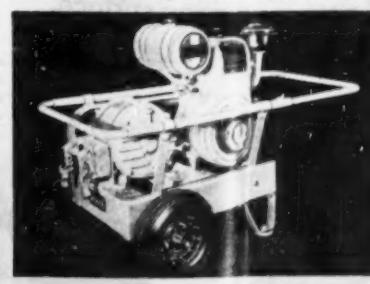


SIDE FORM VIBRATION. Works equally well mounted ahead of finisher screed or in rear of spreader. Controlled by finisher operator, it saves better part of two men's labor. Will not snag forms or reinforcements, or penetrate into sub-grade.



GENERAL CONSTRUCTION

(Left): 6 H.P. engine-driven, flexible shaft vibrator. Excellent for both thin and thick sections. (Right): 2½ H.P. electric vibrator (for light-socket operation). Handy as a pocket in a shirt, powerful enough to handle all general construction concrete vibration with shafts up to 28'.

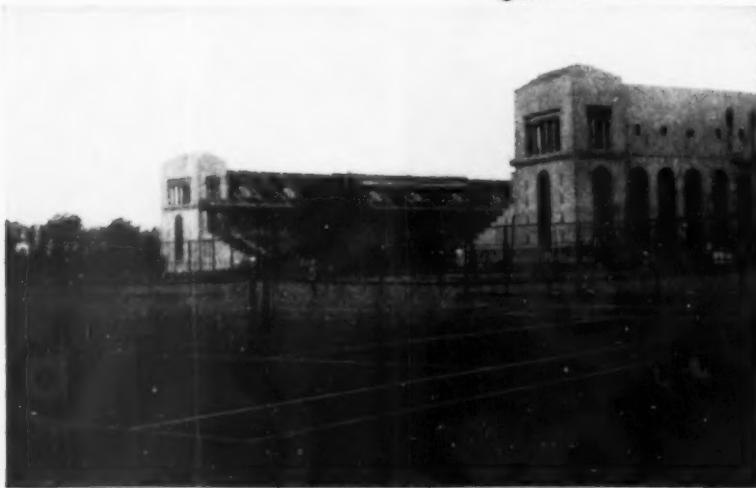


DUAL CURRENT PORTABLE POWER
for operating all JACKSON machines and lights.
2.5 to 7.5 KVA, providing both single and 3-phase
60 Cy. 120 V. AC (120/240 V in larger models).
Permanent magnet generates - require no adjustment or maintenance.



MASS CONSTRUCTION. The JACKSON VS-4 Vibrator has no rival in economically and efficiently placing mass concrete in dams and similar construction.

JENNITE J-16[®] Surface Seal



TENNIS COURT ASPHALT PAVEMENTS—LAST LONGER IF SEALED WITH J-16 BECAUSE:

- J-16 stops water seepage which causes softening or failure of base.
- J-16 stops frost action resulting in progressive ravelling of pavement surface.
- J-16 protects such pavements from oxidizing or volatilizing action of the sun.
- J-16 seals in surface oils of asphalt pavements which sometimes smudge tennis balls.
- J-16 provides a long lasting attractive satin-black, tough, easy to clean, wearing surface.

Protective maintenance pays



For complete details
on Jennite J-16—
Write for Specifica-
tions and these two
brochures.



MAINTENANCE INC.

WOOSTER, OHIO

CABLE ADDRESS "MINCO"

Applications of Diesel Tractors with Loader

A new brochure illustrating and specifying applications of Sheppard diesel industrial tractors equipped with Baker-Lull shoveloaders has been issued by Sheppard Diesels, and is available from Baker-Lull Corp., Dept. KP, 376 W. 90th St., Minneapolis 11, Minn. The two-color literature lists chief features of the equipment, together with attachments available and specifications for all models. Applications of the shoveloader and special economy features of diesel operation are also outlined.

Power Packs for Lighting and Power Service

A new 8-page illustrated bulletin (GEA-5928) on Inductrol power packs, for a-c lighting and power service up to 112.5 kva, 600 volts and below, has been announced by General Electric Co., Schenectady 5, N. Y. The bulletin explains why voltage should be regulated and the advantages of using packaged equipment to provide this regulation. It also presents data and prices on three-phase Inductrol power packs.

Applications of Air Vibrators in Construction Industry

A 6-page folder (No. 106) published by Cleveland Vibrator Co., 2828 Clinton Ave., Cleveland, O., describes the application of its line of air vibrators in the concrete, construction, building and concrete product industry. The folder contains information on the application of Cleveland vibrators on bins and hoppers, as well as their use on trucks and railroad cars handling aggregate materials, cement, sand, etc.

Barricade Combines Four Separate Features

The Underwood patented barricade is illustrated and described in an 18-page catalog issued by Underwood Patented Barricade, Inc., Crowley, La. The barricade is an adjustable unit, strongly built all of steel and combines all the desirable features of safety, visibility, portability and durability into one compact unit. All models have been tested in actual use by road contractors.

Hose, Conveyor Belts, V-belts and Tape

An 8-page rotogravure brochure on its products, issued by Boston Woven Hose and Rubber Co., P. O. Box 1071, Boston 3, Mass., stresses applications and installation. Each Boston product, exclusively designed for the mining and allied industries, is related to a case history which is pictured. Text is done exclusively in picture captions.

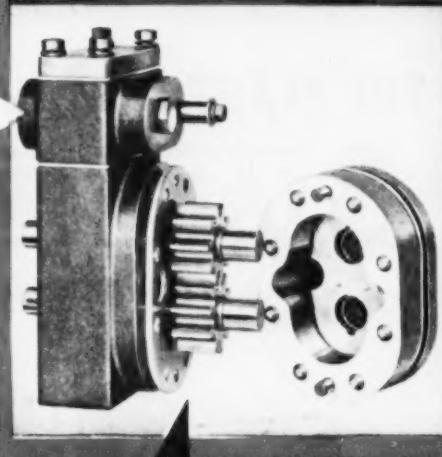
Mechanization Methods for Concrete Joints

A new 24-page fully illustrated technical booklet, issued by Flexible Road Joint Co., Warren, O., discusses poured, pre-molded, ribbon and vibrated joints for concrete highways and airports. The booklet shows how modern mechanization methods makes it possible to do a better job, faster, at much lower costs.

Salt Stabilized Roads, the How and Why

An 8-page bulletin "Morton Salt Stabilized Roads," published by Morton Salt Co., 120 S. LaSalle St., Chicago 3, Ill., describes this type of road and its construction fully. The equipment used is listed and the 10 steps in blade mix construction are illustrated and described.

THE BIG DIFFERENCE HERE



MAKES A BIG DIFFERENCE HERE!

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A NEW CONCEPT of DUMP TRUCK PERFORMANCE from **GarWood**

Now, from Gar Wood, here's a complete new line of advanced-engineered, precision built hydraulic pumps destined to bring Gar Wood owners a brand new concept of heavy-duty hydraulic hoist performance . . . pumps designed and field tested for levels of hydraulic efficiency never before achieved by any manufacturer.

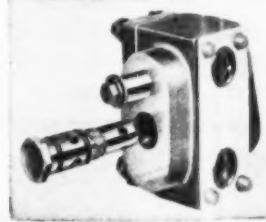
Gar Wood's new three-piece pump housing design eliminates gear alignment problems inherent in other pumps having counterbored gear shaft mountings. Closer tolerances can be held in production . . . results in precision manufacture and assembly never before possible . . . assures longer life and greatly improved performance in actual field service. New 10-tooth pump gears have larger, stronger teeth with gear width and diameter scientifically calculated to provide increased oil flow at all speeds. Increased pump output assures fast, positive hoist action with instant response to hoist controls for most efficient dumping of heavy loads.

Gear shaft sizes have been increased to provide greater strength and more rigid gear mounting . . . shafts cannot deflect under heavy

loads to cause improper meshing of gears. Tooth contact is positive under all load conditions—spalling and premature wear from incorrect alignment are eliminated. Shafts are mounted in large needle roller bearings with increased load capacity for long life and quiet operation. Precision machined aluminum wear plates prevent side play in gears—eliminate scuffing and resultant gear failure. Special alloy steel bolts hold pump assembly permanently rigid . . . assure permanent, positive alignment. Alloy steel bolts cannot stretch to permit oil leakage and thus impair hydraulic efficiency. Field service is simplified too, since all housing faces are mirror-finished to permit leakproof assembly without gaskets . . . no hand fitting of parts is required.

For profits' sake, investigate heavy-duty Gar Wood hoists featuring the new line of Gar Wood hydraulic pumps. A complete line of heavy-duty pump sizes and capacities assures the right pump for every heavy-duty Gar Wood hoist—and you'll discover a new level of hydraulic efficiency and heavy-duty hoist performance never before available to truck owners and operators. See your local Gar Wood Distributor or use the coupon below to obtain full information.

New, precision built, balanced spool valve ends creeping . . . permits positive positioning of dump body by cab control without binding. Valve mounts on either end of pump for simple conversion to right or left hand drive. One-piece "unit" construction of ball check assembly permits easy inspection and replacement when necessary.



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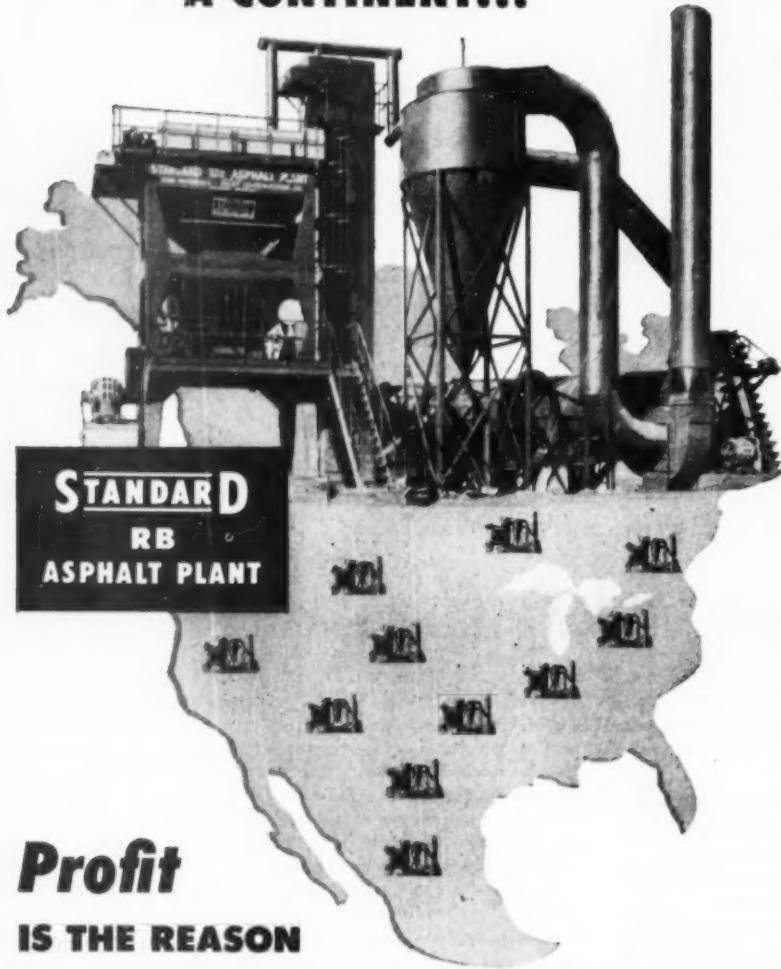


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Acetylene flare for emergency operations

The new Airco acetylene flare, a simple but rugged gas operated unit for emergency night-time lighting, has been announced by Air Reduction Sales Co., 60 E. 42nd St., New York 17, N. Y. This new flare, using acetylene gas as a fuel is stated to provide a practical and convenient means of obtaining a large amount of illumination on and around the work area. Unlike the conventional spot or floodlight which afford a limited angle of serviceable light, the Airco acetylene flare supplies a full 360 degrees of light around itself. The flare is of all-welded construction, incorporating a sturdy wind-shield, a standard acetylene gas valve, and a 5/8 in. diameter steel rod to facilitate mounting.

Specifications for Excavators and Truck Cranes

Three new specification booklets giving detailed information on the Gar Wood $\frac{1}{4}$ yd. Model 75A and Model 75B excavators and the 75BT truck cranes have been announced by Gar Wood Industries, Inc. The booklets show all the capacities, ranges, reaches and attachments available for all three models. Additional information on the foundation borer, the right angle drive, travel speed, power plants plus other important data are also contained in the booklet.

All Steel Clamps for Wood Curb Forms

A 4-page bulletin (No. 131) describing uses and showing typical installations for Pacific clamps has been issued by Pacific Engineering Sales Co. Construction of concrete curbs on the existing slab without drilling holes is possible using these 2-piece, all steel, self-locking clamps. Used in combination with wood curb forms, they are stated to handle any curb job in general use. Features claimed for these clamps are the elimination of nailing, saving of lumber, and faster set-up and take-down.

Membrane Forming Concrete Curing Compounds

A new line of concrete curing compounds is described in a 6-page brochure, announced by Servicised Products Corporation. These compounds are designed to meet all specifications. They include pigmented compounds in white or gray, which provide a membrane capable of reflecting heat. Clear curving compounds available in both wax-resin and resin base types. Three separation compounds for tilt-up or precast concrete construction and a block curing compound.

Truck Cost Records Eliminate Guess Work

The 31st edition of the Autocar record book to aid heavy duty truck owners in keeping a day-by-day report on operation costs is now ready for distribution by the Autocar Co. Simple one page instructions for use on the 12 double page monthly record sheets, included in the book, enable any motor truck owner to eliminate all guess work from operating and maintenance expenses.

Electromagnets and Magnet Controllers

A new illustrated bulletin on its line of electromagnets and magnet controllers has been announced by The Ohio Electric Mfg. Co., 5100 Dunham Road, Cleveland, O. The 8-page, bulletin is profusely illustrated with cutaway section, photos, and application shots of Ohio lifting, separation, and road-sweeping magnets. It also gives magnet weights and lifting capacities for all standard bolted, welded and basket type Ohio magnets.

New powdered asphalt paint for bridges

Baromix, a new powdered asphalt paint in aluminum and three other colors has recently been introduced by the Asphalt Specialties Division of Berry Asphalt Co., Magnolia, Ark. It is the result of years of research and offers many unusual and helpful advantages. There is no waste, because it is packed in dry powder form and you mix only what is needed, and the remainder in dry form will keep indefinitely and will not decompose or harden in the container.

Baromix may be easily and quickly mixed with kerosene to any consistency required, and can be applied with brush or spray gun. When properly applied it is claimed to provide a permanent bond to metal, wood, concrete or composition. Because of the asphaltic base of Baromix it is stated to offer exceptional resistance to weather, smoke, fumes and soil acids. Baromix is stated to be particularly adapted for protecting bridges, chemical plants, airport hangars, refineries, galvanized buildings, water towers, oilfield equipment and tanks, barns and agricultural equipment.

Elevating Grader Attachment For Road Grader

The B & L heavy duty elevating grader attachment for Gallon motor graders is illustrated and described in a 4-page bulletin issued by the Construction Machinery Division, Barnard & Leas Mfg. Co. This attachment has a 42 in. belt width and a standard carrier length of 16 ft. which can be extended to 19 to 22 ft. by one or two 3 ft. extensions. The elevating attachment is designed for easy attachment to the grader. The elevator can be removed and the blade and other equipment placed on the grader readily. The power take-off is by direct connection to motor drive shaft with V-belt drive connecting through heavy duty disc clutch controlled from the cab of the grader.

Heavy Duty Dump Bodies and Hoists

A new catalog (No. HB302) featuring the Gar Wood heavy duty line of dump truck hoists and bodies has been published by Gar Wood Industries, Inc. Featured in the new bulletin, is the Gar Wood exclusive cam and roller hoist which reduces damaging stresses to both the truck chassis and the body by exerting a more vertical lifting force when dumping. Also illustrated is the flex-a-matic action of the cam and roller hoist which permits hoist roller assembly, piston rod and piston to rotate with flexing of the chassis. The bulletin also shows Gar Wood heavy duty bodies with full width rear apron and rear corner posts welded into an integral unit.

New ACCO Wire Rope Sling

A 4-page folder, describing a new A CO Registered Wire Rope Sling, "the SW-55" — has been announced by the Wire Rope Sling Department, American Chain & Cable Co., Inc. Attractively illustrated in three colors, folder DH-421 describes the merits of the proof-tested SW-55 sling: shows the type lifts it will handle efficiently; has complete specifications, dimensions and recommended uses.

Heavy duty tractor is easy to operate

A new catalog on its new OC-18 Industrial tractor, "The Tractor with Air Steering," is available from The Oliver Corporation, 400 West Madison St., Chicago 6, Ill. This literature explains how this large tractor, with a 133 drawbar horsepower, can be operated with unusual ease. Included are application photographs, diagrams and sketches as well as complete specifications.

Booklets Give Information On Explosives

Two booklets, one containing the latest information on Hercules' complete line of industrial explosives and blasting supplies, and the other containing up to date information on the company's ammonium nitrate dynamites and semi-gelatins, are available from Hercules Powder Co. The booklet entitled "Hercules Explosives and Blasting Supplies" lists all of the company's explosives and blasting supplies for construction, mining, quarrying, agriculture, and seismic prospecting. Included in the booklet is a tabular summary which lists the properties of Hercules high explosives and a page index to a complete description of each type. The other booklet, "Hercomite and Gelamite Explosives" describes the advantages and properties of these two modern, efficient Hercules explosives. The "Hercomite" series are ammonium nitrate dynamites and the "gelamite" series are semi-gelatins designed to economically replace gelatin or gelatin extra explosives.

Catalog Explains Euclid "Lever Action" Scraper

Details of the new "lever action" Euclid 15.5 yd. scraper, having vertically mounted jacks actuating levers which independently control the bowl, apron, and elector, are presented in a 16-page catalog folder available from the Euclid Road Machinery Co. The new scraper design eliminates all cable with the exception of a short length used to open the apron and incorporate a simplified hydraulic system having a heavy duty pump mounted internally in the supply tank. All four hydraulic jacks are interchangeable and the cutting edge has been designed in four sections, each blade being interchangeable and reversible and may be set to various degrees and patterns of overhang for loading in various soil conditions.



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- Low in cost

Made in 5 thicknesses — 1/8", 3/16", 1/4", and 1" — in any length or width to meet job specifications. Formed between two sheets of heavy asphalt saturated felt paper, which increases strength and rigidity and improves handling.

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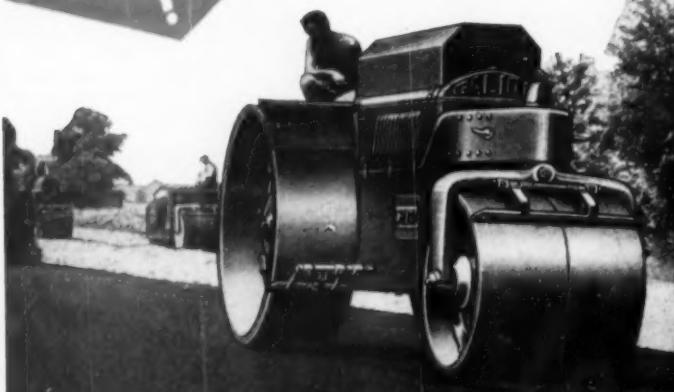
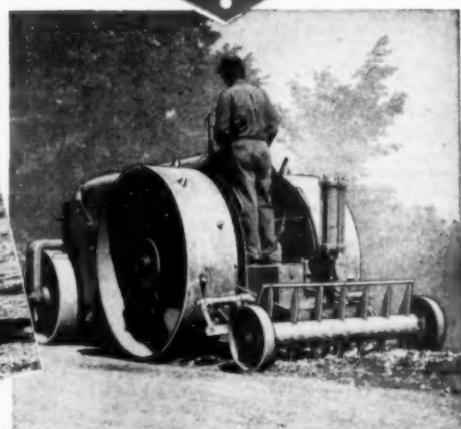
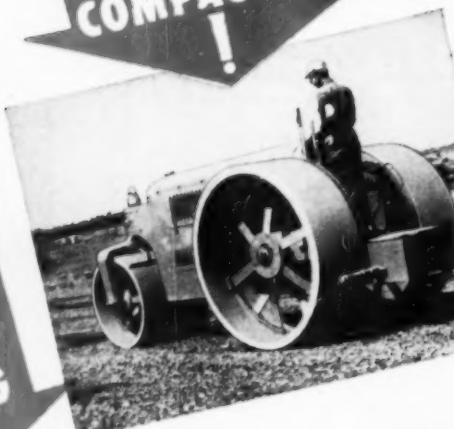
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| 1—Model 22B, Bucyrus Erie Shovel, Crane and Backhoe, diesel | 20,000 |
| 1—Model 25, Northwest Shovel and Dragline, diesel | 17,500 |
| 1—Model 6, Northwest Shovel and Dragline, diesel | 25,000 |
| 1—Model 38B, Bucyrus Erie Shovel, Dragline and Backhoe, diesel | 30,000 |
| 3—Model 54B, Bucyrus Erie Combination Shovels and Draglines, diesel | \$46,000 to 57,000 |
| 1—Model 54B, Bucyrus Erie Shovel only, diesel | 44,000 |
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| 1—Model 88B, Bucyrus Erie Combination Shovel and Dragline, diesel | 112,500 |
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| 1—Model 25, Northwest Truck Crane on Dart under carriage | \$ 22,000 |
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| 10—D8 Caterpillar Tractors with Cat PCUS, Dozers and Johnson Bars | \$9,500 to \$ 11,500 |
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| 1—5-Shank Davenport Ripper | 1,000 |
| 1—9-Wheel Pneumatic-Tired Roller with 1600 x 24 tires, 45,000 lbs. | 2,000 |
| 1—Model 28 Caterpillar Ripper | 2,750 |

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| 1—Model 10B3 McKiernan-Terry Pile Hammer | 2,700 |
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- 1—18"x60' Telsmith, 3 ph, 60 cy, 220V Motor

EQUIPMENT MAY BE INSPECTED AT BRONX, NEW YORK FOR FURTHER INFORMATION CONTACT:

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- OSGOOD 200 Back Hoe.
 - CATERPILLAR D4 Hydraulic Dozer, 4R Series.
 - CATERPILLAR D6 Cable Dozer, 2H Series.
 - CATERPILLAR D6 LaPlant Choate Hydraulic Angle Dozer, 4R Series.
 - CATERPILLAR D7 Cable Dozer, 3T Series.
 - SPRINGFIELD 10 Ton, 3 Wheel Roller.
 - CATERPILLAR 12 Motor Grader, Scarifier Generator, and Lights.
- This equipment is all in good condition.*

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- Heavy duty H-B Moto paver. S/N H-177, new 1950. Good Condition \$18,000.00 Burch, 32-ft. car unloader, powered with LeRoi D-201 engine. Mounted on steel wheels \$1,100.00

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- 2—APSCO trench rollers.
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FOR SALE

- 1/2 yd. Model 25 NORTHWEST Shovel, Backhoe and Crane combination, D-4600 CAT engine.
- 1/2 yd. UNIVERSAL Truck Crane with generator set, mounted on Henderson pneumatic tired truck.
- Model 392 MARION Hi-front stripping shovel, 1946 machine.
- CATERPILLAR Tractor Model D-6, cable controlled bulldozer.
- CATERPILLAR Tractor Model D-7, 3-T Series, Bulldozer, DDPCU Motor and Pony motor, completely rebuilt.
- C-22 WAYNE Crane, Shovel Crane and Backhoe. 1948 Machine.
- 45" Cutter Hammer Magnet.

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- 1—5'x12" 2 Deck Vibrating Screen Telsmith #26S, 3 ph, 60 cy, 220V Motor
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- 1—4'x12" 2 1/2 Deck Vibrating Screen Pioneer, 3 ph, 60 cy, 220V Motor
- 1—4'x10" 2 Deck Vibrating Screen Pioneer, 3 ph, 60 cy, 220V Motor
- 1—2'x8' 2 Deck Vibrating Screen Telsmith

MISCELLANEOUS CRUSHING EQUIPMENT

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- 1—15 cy Sand Drag Cedarapids, 3 ph, 60 cy, 220V Motor
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75 H.P. Motors

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2—D8 Dozers, Serial Nos. 217673 and 217945, with DDPCU and new Cat 8S Blades, good condition, each \$13,500

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1—Wayne Crane, 6-ton combination and 1/2-yd. backhoe, like new 7,000

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1—Cat 12 Motor Grader, Model 9K 5,250

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(D6, D7, D8, TD18, HD14, etc. Tournapulls and Graders)
in running condition, for rebuilding purposes.

AGAINST NEW TRACKS

(Complete assemblies for D6, D7, D8, TD18, HD14, HD19, etc.)

If you prefer we will pay you in new Roller Assemblies, Engine parts, Final Drives, etc. State your exact needs.

Please give all details of your machines, such as Serial numbers, Dozer equipment, if any, physical condition, location, as well as rockbottom price basis to:

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1/4 yard American shovel, with Waukesha gas engine, new 1940 Serial No. G.S. 394. \$5,750.

1/2 yard Model K-12 Insley, 3 way combination with 1/2 yard Hendrix bucket Kohler light plant, new pins in track, new bushings, overhauled motor. 6 cyl. Buda engine \$8,500.

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CRUSHING AND SCREENING MACHINERY AVAILABLE FOR PROMPT DELIVERY

New 20"x36" roller bearing jaw crusher. New 10"x36" roller bearing jaw crusher. New 30 TPH portable, one pass crushing and screening plant with 14"x24" roller bearing jaw crusher.

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1—16 S Kwik-Mix Koehring Concrete Mixer, gas engine, 4 pneumatic tires, Batch-meter and pump—like new.

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The above Cranes have Fourleads and Taglines.

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Complete running gear and power erecting equipment for Cedarapids Model E asphalt plant.

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Crushing Plant Complete

New July 1952—Ready to Operate
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Makes all size Aggregates
Primary 2540 Cedar Rapids
AAA Portable with Feeder
Secondary 37 1/2 Kennedy Gyrotary
Triple Deck 4'x12' Screens
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4 Bins and 4 Conveyors
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- CATERPILLAR TRACTOR with 5 1/2 ft. Dozer . . . old model . . . good condition, with Trailer \$850
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2 front axle assemblies
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 Universal Jaw Crusher—14" x 24".
 18" x 6' Feeder. 24" x 22" conveyor. Portable. 4—9:00 x 20 tires
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 5 sets removable tip hammers.
 2—40' conveyors, 18" belt. One new.
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 All conveyors are stationary.
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 Electric Motors—125 hp Wagner, 10
 hp Howell, 7 1/2 hp Westinghouse,
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 1941 Ford dump truck.
 1946 International dump truck.
 1952 F-6, Big Six Ford truck, 17,000
 miles, with Baughman spreader
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 3 Salamanders, used very little.
 5 Tarps, 12 x 33, used little.
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 Shop tools, etc.
 This equipment is located in North Central Iowa with a large territory to serve.
 Also binder base clay and an opportunity to furnish road rock for county road work.
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One Rex 190—single Pumpcrete,
 30 hp motor, accessories and
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 Strts. and bends.
 A.H. & D. Co. 3-drum hoist, Gm
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 Concrete Mixer 28S-CMC, 25 HP
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 Adjustable 20" to 26" trench. \$3800 for
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| 1—Air compressor, LeRoi 60 cu. ft. \$1,000.00 | 1—27E Ransome concrete paver (Rebuilt) \$3,500.00 |
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| | 1—DW-10 "Caterpillar" tractor and scraper IN 20 Series \$7,500.00 |

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Equipment Yard
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14 Mi. N. of Cols.
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 2—TD-18 Tractor; Serial TDR-10125-T7EM.
 3—TD-18 Tractor; Serial I-15410.
 4—2 Euclid Bottom Dump Trucks #KG639, Bar-
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 5—Syntron Gas Vibrator, Type 2, Air Cooled
 Wisconsin Engine.
 6—GMC Concrete Mixer #16-S, Air Cooled
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 7—Chicago Pneumatic Vibrator #CP1910, 20' Hose.
 8—Appro 87 sets Spirole Form Clamps: Assem-
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 9—Ingredient Wheelbarrow Scale, 3 beam.
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 11—Thor Paving Breaker #25; 1 1/2" Hex.
 12—2 Used concrete buggies W/Pneumatic tires.
 13—Manitowoc Hi-Lift #3500; Serial #3585, Mo-
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 Contained Generator Sets, \$1,695 each. Westing-
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 1—TE-100 Switchboard has two 150 amp meters. One
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 1—CL-43 Clark 3500 lb. capacity
 1—CL-43 Clark 4000 lb. capacity
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| 4 | 5 HP Howell, Frame 254, 3 Ph., 50/60 220/380/440, 1740/1440 RPM. | \$ 80.00 |
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| 8 | 5 HP Westinghouse, same as above. | 80.00 |
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| 5 | 4 Cyl., 30 HP Wisconsin Power Unit with #4 Bell Housing. | \$225.00 |
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| 21 | 6 Cyl., 112 HP Continental Power Units with #3 Bell Housing | 725.00 |
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I—Cedar Rapids 9"x36" P.B. Jaw crusher; wt. 15,000 lbs. Price \$500.00.
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Will trade all or any of listed items on 8" pump with pipes and fittings.

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LORAIN Model 95

70 Ft. Boom, 2½ Yd. Bucket
Caterpillar D-17000 Motor

Price . . . \$16,000

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Model 1500—1½ Yard
Cummins Diesel Engine
Price . . . \$6,000.00

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MICHIGAN TRACTOR & MACHINERY CO.
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\$12,500.00

Also

RD-6 Caterpillar Tractor with Cable Dozer, \$4500. Both f.o.b. Albany, Wyo.

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4—Caterpillar D8 tractors, all equipped with DDPCU's and two have dozers.

3—Gar Wood cable 517 Scrapers.

1—No. 12 Caterpillar Motor Grader.

1—Allis Chalmers WHD7 tractor with Gar Wood dozer castor, several misc. smaller items. Rooter, compressors, welding machines, etc.

All of above rebuilt to work; cleaned, painted, guaranteed. For sale because of change in owners plans.

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Caterpillar D8 Tractor 2U, w/Cat 25, D.D.P.C.U. & Bulldozer.....\$40,500
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 Cat. D6 Hyd. Angledozer.....\$2,350
 Cat. D4 Hillift.....\$1,250
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 Cat. R4, Dozer & Winch.....\$1,950
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 LeTourneau LS Scraper 8-11 yards.....\$2,750
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This is everything you need
 On the job batching 70 yds. per day
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 4 Yd. CHAMPION Mixer.....\$3925.00
 New GMC Truck3900.00
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 Price complete FOB Denver.....\$15,515.00

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 IMMEDIATE DELIVERY**

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New Buda diesel, model 6BTS-468,
 engine still in crate, with complete
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 will supervise your installation and
 warrant engine. List price of \$3900.
 We will, for immediate sale, take
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1 Used Universal Model 880 crushing
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International KR 11-1944 transmission, Head
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 KR 10, 1941 and KR 11, 1944.

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Lorain Model 25 dragline, 1950 machine.
 Excellent condition.

Lorain 82 drag, w/ 60' boom, 2 yd. Hendrix bucket, Diesel engine.

Lima 1201 drag, Cummins engine.

Koehring 303 shovel & drag, comb., 3/4 yd. bucket, Cat 4600 engine.

Lorain Model 41 heavy duty 3/4 yd. drag, 40' boom, Cat. 4600 engine \$9,500.00

Lorain 75B shovel, Cummins engine.

Insley K12 drag. Extra good.

HD19 Dozer w/Baker blade.

TD14 Dozer, in good condition.

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Buckets, pumps, scales, vibrating screens
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New and Used Construction Machinery

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 - 1 Brox Steam Generator, 1949—SG 5ST.
 - 1 Kewanee Firebox Boiler 1930—#1314.
 - 1 43B Barber-Greene 30 ft. Conveyor.
 - 1 Littleford Pump LY 1006 MP, less sealed valve B-2-C1, with VE-4 Wisconsin engine & S-42-C1, coupling.
 - 1 Centrifugal Rex Pump, 40-M.
 - 1 Pettibone Mulliken Speedloader Model 3.
 - 1 Onan Generator 500 RPS.
 - 1 Schramm Compressor, with International Diesel Engine, Model 315.
 - 1 LeTourneau 3 Tooth Cable Control Roster, Model 5.
 - 1 International Crawler Tractor, rebuilt, with Bucyrus-Erie Angle Blade, TD 14.
 - 1 Gallon Motor Grader 118.
 - 1 Adams Motor Grader, 1947 - 414.
 - 1 International 74 in. Wide Gauge Crawler Tractor, with Bucyrus-Erie Angle Blade, TD-18A.
 - 1 Bucyrus-Erie S-113 Scraper.
 - 1 LeTourneau Roadster, Model "D".
 - 1 Triplex Tamper G85.
- Also offering Air Hose, Jackhammer, etc.

HINKLE CONTRACTING CO.

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1 Barber-Greene Black Top Paver
 at once.

State price, year, and Serial Number.

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10 Wheel diesel-tandem drive dump trucks.
 1950 Mack Model L.J.S.W., Cummins 165.
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 10 Yard Gas Wood bodies and Bushes. Clean trucks.
 11,000-24 tires. Price, \$7,500 each.

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1 UNIVERSAL Master Twin-Dual Crushing Plant. Large Capacity, 30" Belts Throughout. Diesel Power.

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2 SCRAPERS, 8-10 and 6-8 Yards.

1 3000 Gal. Semi-Trailer Water Sprinkler.

2 CATERPILLAR Elevating Graders, late models.

1 20-Ton Portable Truck Scale.

1 15" x 36" Jaw Crusher.

1 100 H.P. PD-80 IHC Power Unit.

2 ADAMS Motor Graders.

All equipment in good condition,
 priced to sell quick because of
 poor health.

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COMPLETE BATCHING AND MIXING PLANT

INSTALLATION INCLUDES A TRACK HOPPER AND DISTRIBUTING SYSTEM FOR STORING AGGREGATE IN BINS SITUATED OVER A 90" X 200" RECLAIMING TUNNEL

ALSO INCLUDES:

2—Koehring Model 56 SA 2-Yard Tilting Mixers equipped with Consistency Meters, Electric Batchmeters, Graphic recorder.

1—Model CAT55 Noble Fully automatic Batching and Mixing Plant including 150 ton, 5 compartment aggregate bin.

1—2 Cubic Yard Weigh hopper with central cement compartment.

1—6 Beam back balance type scale and Strip recorders for water, aggregate and cement.

1—2,400 barrel ground storage cement silo and 500 barrel elevated silo.

1—Track hopper for cement deliveries with screw and bucket conveyor systems.

Purchased NEW in 1951 and has mixed approximately only 80,000 cubic yards concrete

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Koehring 605 erection crane. 1½ yd. or 32 tons capacity. GM diesel engine. 140 ft. boom.

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Unit Model 1020 pneu. tired mobile crane, 10 tons, 40 ft. boom.

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1 LaCrosse 5 Ton Trailer for transporting Trencher.

Priced Reasonable

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Each tooth is made of a solid piece of 2½" steel. Will withstand rugged operation. This rake is a solid unit with the solid teeth an integral part. This rake can "take it." The teeth are set so that they can be easily run at the desired level without "digging in."

This rake is designed to move large quantities of trees and brush. Will compact larger quantities into smaller areas.

These compacted piles can be easily burned.

A strong, sturdy rake that surpasses any on the market for piling brush, trees, stumps and roots. This rake was designed to meet the requirements of land clearing companies. THIS RAKE IS RAPIDLY REPLACING OTHER TYPES OF RAKES.

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Equipment Values!

D4 Traxcavator—Caterpillar, Serial #5T1524WSP. A 1 cu. yd. front mounted gravity feed Traxcavator. Cable controlled, has a flat type shoe and a 1 yd. bucket which is 75" in width. This machine is a few years old and really a good buy. F.O.B. Louisville \$3,650.00

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Adams 412 Grader, \$1500.

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HOUGH HE 1/2 yd. Payloader
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All equipment located in Mississippi, with or without 225,000 yards of good drainage work.

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- 1-Jeager Model 125 portable air compressor, 125 cu. ft. capacity, 2 rubber tired wheels, powered by 6 cyl. Continental gasoline engine, A-1 condition \$1,750
- 1-Barber Greene Model 428 Belt Conveyor, 30 ft. long, has 24" belt, 4 cyl. Wisc. gas engine, 2-rubber wheels \$1,675
- 1-Littleford 1,000 gallon distributor, has spray-bar, asphalt pump, etc., mounted on International Model KB57 truck, used very little, in A-1 condition \$7,250
- 1-Freelohup asphalt supply tank trailer, 3,800 gallon capacity, has flues and 2 burners, 200 GPM asphalt pump with engine, tires all good, A-1 operating condition \$4,450
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- 1-Bros steam generator Model SG55T, #2004, 3 car capacity, cleaned and painted and in A-1 condition \$2,500
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- 1 Koehring Longitudinal Finisher 20-24'.
- 1 Heavy Duty 20-24' Trailgrader.
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Clam Bucket, Williams 1/2 yd. low bed trailer with solid tires, oscillating rear axles, and 10' x 18' platform—ideal for moving buildings, 700 ft. used 6-in. galv. downspout, GRAVEL WASHING EQUIPMENT—one 4' x 10' rotary scrubber with 4' x 14' screen attached, with gears and bearings; two sand settling tanks; one bucket elevator; one water pump with gas power Barber-Greene Bucket Loader on Cots—Spiral Feed.

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A-C Model HD14 Tractor w/ angledozer.

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"Caterpillar" Model D-4 tractor. good shape.

International TD35 Tractor. Cheap.

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"Caterpillar" RD-7 tractor. Very clean.

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Slusser-McLean 8-10 yd. cable scraper. Slightly used.

1—Novo traffic line marker.

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Pettibone-Mulliken "421" Swing Loader. ½ yd., 4-wheel drive. Demonstrated 30 hours @ Dealer's Cost.

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Smith 3 yd. Hi-Discharge Mixer with Truck.

Rex 2 yd. Hi-Discharge Mixer w/ Ford Truck.

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Trailer 10-Ton Single Axle, semi Low-Bay w/ Mack Tractor.

Cedarapids Portable Primary Plant on Pneumatics w/ 1524 Jaw Crusher. 24"x6'0" Apron Feeder, gas power.

30' discharge conveyor, etc.

Universal 800 JF. Portable Gravel Plant. 1024 Jaw, 24x16 Rolls, etc., Pneumatics.

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(1) Koehring Cruiser Crane Model 205, ½ yard capacity with 40' boom, Chrysler gas engine, hydraulic steering and one man controls.

(2) Galion Model 118 Diesel Motor Grader, tandem drive powered by UD-16 diesel engine, fully enclosed cab and scarifier, used only four months.

(3) Allis Chalmers Model "D" Grader with Loader completely rebuilt with new tires.

(4) Galion Trench Roller, electric starting gasoline engine, hydraulic steering and adjustable wheels, used less than one month.

(5) Rebuilt Koehring ¾ yard Crawler, Crane and Shovel Combination, General Motors Diesel power.

All the above equipment carries a standard factory warranty of 90 days and in the case of rebuilt units, they have been completely stripped and rebuilt in our Philadelphia shop.

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1—International T9 Swing Crane Ser. #TCB1349274 \$1900

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1—Cleveland 140 Diesel Ditcher Ser. #5169 5200

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1—1951 Pitman Hydra-lift mtd on 1950 Ford F7 4000

All in good condition

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Complete running gear and power erecting equipment for Cedarapids Model E Asphalt Plant.

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152 H.P., 1200 RPM Superior Diesel Engine, Model 1DB-8-R, with clutch power take off, right hand clockwise rotation with 5½" bore x 7" stroke, radiator cooling unit, air filter exhaust silencer, less batteries and charger.

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With Extra 1-Yd. Coal Loading Dipper
Caterpillar D-318 Diesel Engine

New 1949 Serial No. 19764
Excellent Condition

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New 30 c.f.m. tank mounted, 80 gallon, 7½ HP. 220/440 volts, 3 phase. List \$728. Less 25% Discount. 5 HP. List \$570, Less 25% Discount. Prices F.O.B. Chicago. Write for Free Catalog. Send 70¢ for postage.

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4—2100 x 25 20 Ply earth movers
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One (1) 36"x48" Taylor Jaw Crusher

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One (1) Northwest Model 78D, 2 yd. Shovel

One (1) New Tiltdozer blade for D8 Tractor

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AT A TERRIFIC BARGAIN**

Hill Diesel engine direct connected to 15 KW General Electric generator. 120/208 volts, three phase, 1200 RPM. These units are brand new and are equipped with complete control and panel board, and extra parts. Only 2 units available. Offered subject to prior sale.

\$2250 Each
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New Hobart Signal Corps Power unit PE197. 110-220 volt, 60 cycle, A.C. single phase 5 K W 4 cyl. Hercules 20 H.P. water cooled engine. Remote control push button start. Complete panel board with instruments. Housed in metal case.

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Jaeger self-propelled Aggregate Spreader with Model F226 Continental gas engine; purchased new; used one short season. \$5000.00
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1 each, 14.00x20 and 16.00x20, 16-ply Goodyear all-weather Earth Mover tires; new, never used. Make offer.

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Interesting and challenging work in Detroit's Traffic Engineering Department. A minimum of two years experience is required.

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MOBIL PICK-UP TYPE
STREET SWEEPER**

Used on few occasions as demonstrator. This entire unit is built on the International truck and is as good as new.

Write for additional information.

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Ellertson Heads Pioneer. The Board of Directors of Pioneer Engineering Works, Inc., Minneapolis, Minn., has elected Oscar J. Ellertson to the presidency of the firm, to succeed Melvin Ovestrud, who has retired. Mr. Ellertson was also elected to the board of directors. In becoming president, Mr. Ellertson heads the firm his father, E. E. Ellertson, helped to found and head in 1928 after purchase of the crushing plant business from Caterpillar who in turn had bought it from Russell Grader Manufacturing Co. Mr. Ellertson joined the employ of Russell Grader in 1923 and continued with that firm until 1928. When Pioneer was organized, he became purchasing agent for the latter company. In 1932, he entered the sales department, holding positions successively as salesman, advertising manager, assistant sales manager and export manager. During this period he was also assistant secretary and assistant treasurer.

Volz Appointed Division Sales Manager. George N. Volz, 2816 S. E. 165th Ave., Portland, Ore., has been appointed division sales manager by the Osgood Co. and the General Excavator Co., Marion, O., for the northwestern states and provinces of Canada. Mr. Volz is well known in contracting and logging circles in this territory, having served in a similar capacity for John Roebling Co.

Brandenburg Made Central Sales Manager. John Brandenburg has been appointed central sales manager of the American Manganese Steel Division of American Brake Shoe Co. Mr. Brandenburg joined the company in 1930 as an apprentice and advanced through various production positions to plant superintendent. In 1934 he transferred to the Amsco sales department representing the export division and brake shoe and castings division.

Tiebout Named Vice President. Richard T. Tiebout has been appointed vice president of Baker-Lull Corporation, Minneapolis, Minn. He also serves as manager of government sales for Baker-Raulang Co., Cleveland, O., parent company of the Minneapolis corporation. He joined Baker-Raulang in 1951.

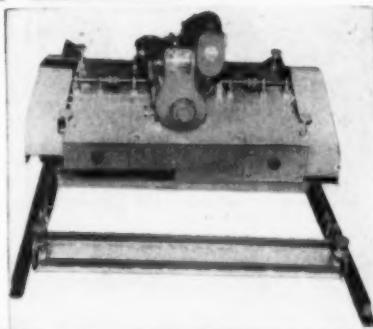
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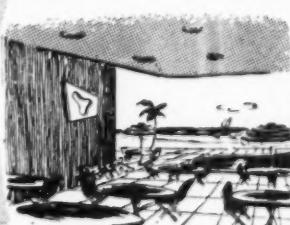
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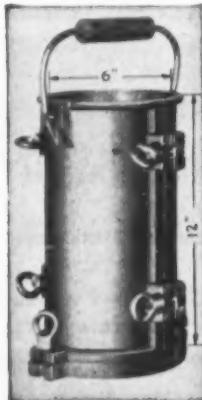
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★ The remarkable expansion in the use of small air-cooled-motor power in industry was dramatized recently by the unique "maypole" shown. Clinton Machine Co., of Clinton, Mich., staged this affair, in which mowers of many makes utilizing their motors were used. Another part of the demonstration showed motorized pavement strippers, sod cutters and rollers, sweepers, mulchers, cutters, sprayers, post-hole augers, chain saws, and other machines used in road and street construction and maintenance.

Shantz Promoted by GMC. A. A. Shantz, general parts and service manager of GMC Truck and Coach Division, Pontiac, Mich., since 1944, has been appointed assistant general sales manager, trucks. In his new capacity Mr. Shantz will have direct jurisdiction over regional and zone activities, national fleet sales, government sales, truck technical service and parts and accessories merchandising.

Meyer Appointed Sales Manager. Curtis Meyer has been appointed sales manager of the Electric Hoist Division of Harnischfeger Corporation, Milwaukee, Wis. He was formerly a director and vice president in charge of sales for Milwaukee Electric Tool Corp.

Kiggen Named White Export Manager. J. A. Kiggen, Jr., heretofore eastern regional coach sales manager, has been appointed export manager of the White Motor Co., Cleveland, O. His headquarters are at 411 Lexington Ave., New York.

Gar Wood Appointment. D. J. Byrd, heretofore Wayne Division district manager for the southeastern section of the country, has been appointed division assistant sales manager of the Wayne Division, Gar Wood Industries, Inc., Wayne, Mich.

Wellman Moves To New Plant. The S. K. Wellman Co. has completed the move into its new Bedford, O., plant. In this present location is centralized all of the equipment formerly housed in three separate plants and warehouses, plus improved production machinery to accommodate a greatly expanded manufacturing schedule.

Moore Joins Pettibone Mulliken. C. K. "Chuck" Moore, for the last year sales promotion and advertising manager of Lorenz Equipment Co., Columbus, O., has been appointed district representative for Pettibone Mulliken companies in the states of Ohio, Michigan and Indiana.

Whitson Joins Toro. Lee Whitson, heretofore in charge of Industrial Engineering Department of University of Minnesota, has been appointed director of manufacturing for Toro Manufacturing Co., Minneapolis, Minn.

American-Marietta Buys Lamar Pipe Co. American-Marietta Co., Chicago, Ill., has acquired the entire interests of the 30-year old Lamar Pipe and Tile Co., Grand Rapids, Mich., and will operate it as the Lamar Division.

New Riddell Distributor. Western Tractor & Equipment Co., 2230 First Ave., Seattle, Wash., has been appointed representative for W. A. Riddell Corp., Bucyrus, O., for the state of Washington.

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Special 28' tapered All-Aluminum standard with 8' overhead lighting upsweep arm on Lakeshore Drive, made to Chicago Park District specifications.

(Photo courtesy Chicago Park District)

White Heating Kettles Have Fire-Proof Tops

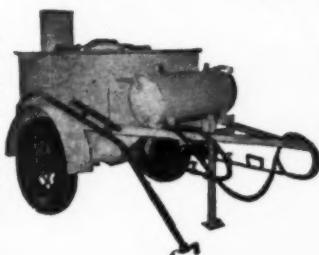
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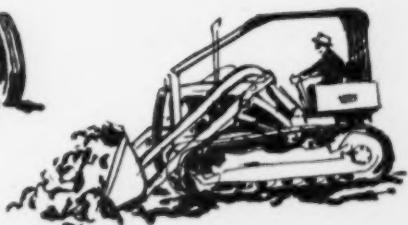
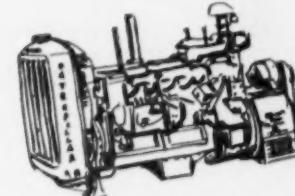
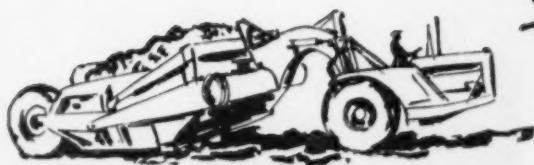
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(For heavy to moderately heavy traffic)

- A. Sheet Asphalt
- B. Asphaltic Concrete (Hot-mixed, hot-laid)
- C. Asphaltic Concrete (Hot-mixed, cold-laid)
- D. Asphaltic Concrete (Cold-laid)
- E. Sand Asphalt

**TYPES IN WHICH ASPHALT IS APPLIED
BY PRESSURE DISTRIBUTOR**
(For moderately heavy to light traffic)

- F. Asphalt Penetration Macadam (Standard and Modified types)
- G. Road-mixed Asphalt Surfacing
- H. Surface-treatment for Loose or Bonded Street Surfaces

asphalt construction for city streets?

The type of improvement called for by a city's streets may range from a heavy-duty pavement down to a light, waterproof mat. Whatever the need may be, there is a type of Texaco Asphalt construction which is exactly suited to all requirements. In the panel at the left is a list of the Asphalt types which are most commonly used on city streets and the volume of traffic for which they are recommended.

Helpful information on all types of Asphalt street construction mentioned in the panel has been incorporated in two Texaco booklets. Interested municipal officials who would like to have copies of these useful publications can obtain them without obligation by writing our nearest office.

More than 1500 representative cities from the Atlantic to the Rockies have paved with Texaco Asphalt during the past 50 years; many of them have laid more than 500,000 square yards to date. As a result of this country-wide service, Texaco-paved streets have been subjected to every variety of traffic and climatic conditions. Their consistently satisfactory performance in all parts of America is convincing proof of their durability and low upkeep cost.

*For practical help with your street paving problem,
experienced Texaco Asphalt field men are at your
service.*



Laying a heavy-duty Texaco Sheet Asphalt pavement.



Applying Texaco Cutback Asphalt for a tough, waterproof mat.

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TEXACO ASPHALT